TECHNOLOGY DEPT.

Gas Journal

Vol. 265. 103rd Year. LONDON, JANUARY 3, 1951. No. 4570. Price 1/-

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Insulation as Industrial Priority

Chairman of the Parliamentary and Scientific Committee, M. Philips Price, M.P. for Gloucestershire West, adds importunity, studious and earnest, to the arguments for the wiser and less wasteful use of heat and power in and throughout British industry. His letter in *The Times* was masterly, forthright, insistent; ". . . it is of paramount national importance that a big drive should be made on the widest possible front in the field of coal utilization." Of coal, the vital currency more precious than rubies, Great Britain must cease to be spendthrift. We of Bell's in this matter of economic health or infirmity, of life or death, of continuing energy or weakness of pulse are at industry's instant service as experts in insulation and conservation. It pays handsomely, if we may express it so, to consult us. Asbestos and other materials and devices in heat-husbandry applied with the most modern scientific and technological accuracy; valves made by Baines of Rotherham sustaining the highest pressures as examples of British skill at its finest; steam-traps eliminating condensate and air from steam mains and so enabling economies in steam to be effected; boiler control equipment to control the generation of steam; the recital is but brief of items in our heat-saving, power-husbanding, efficiency-enriching range of methods and products; the fullest information is at command if you

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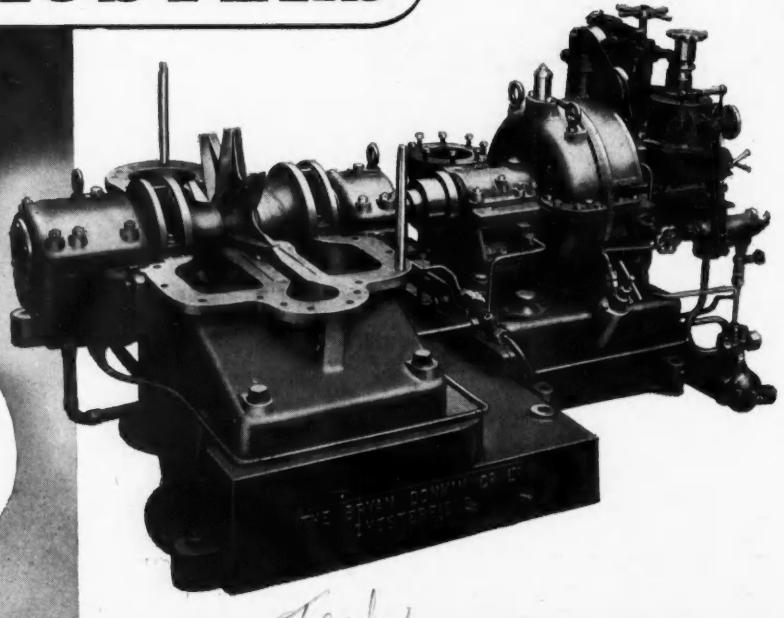

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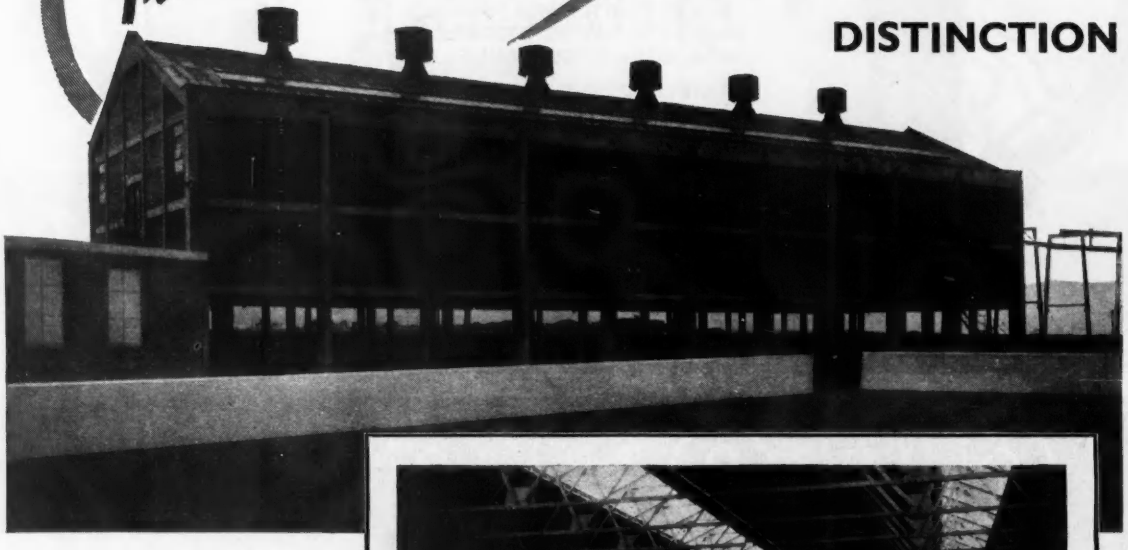

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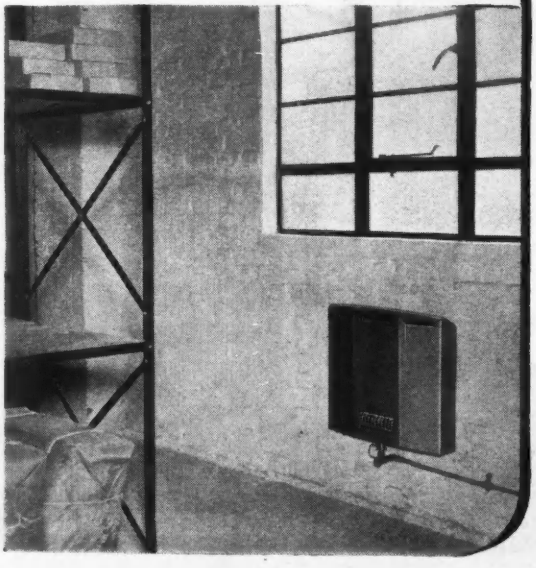

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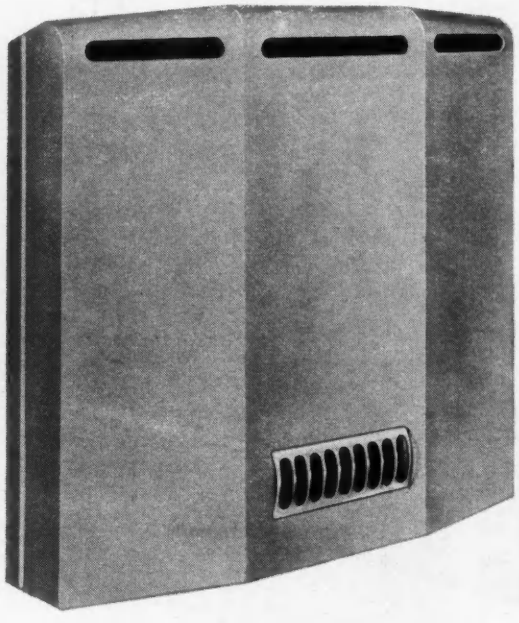

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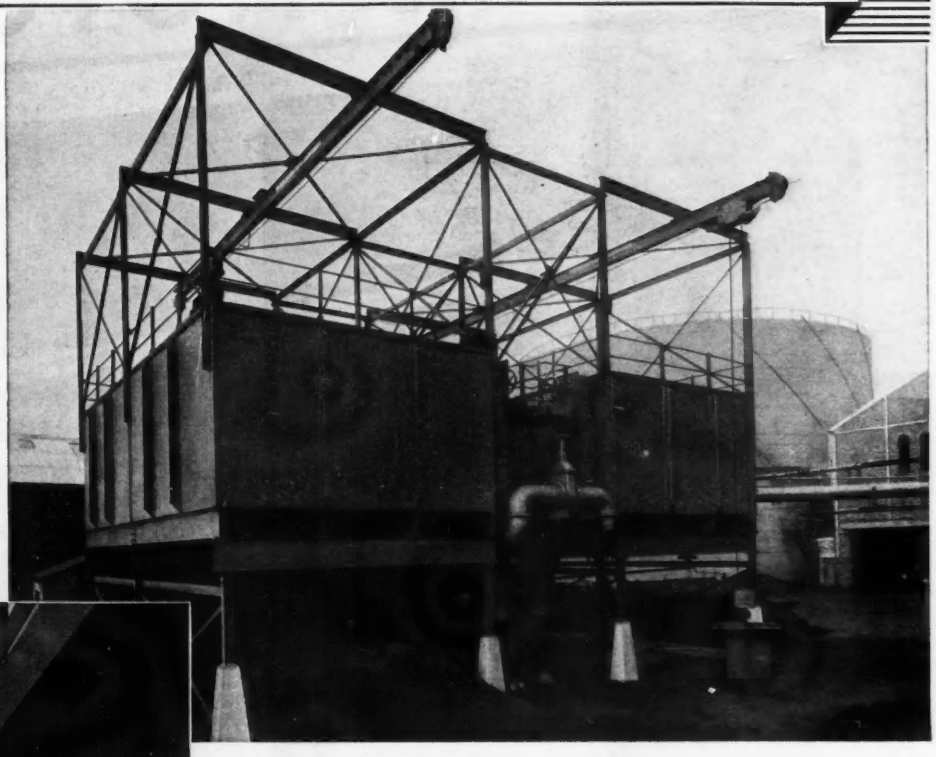

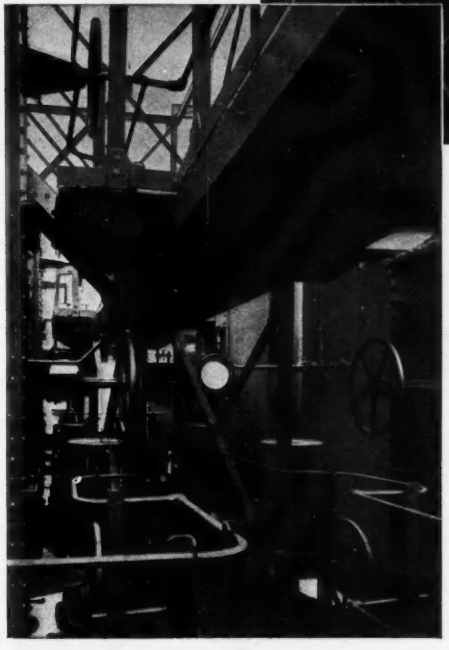

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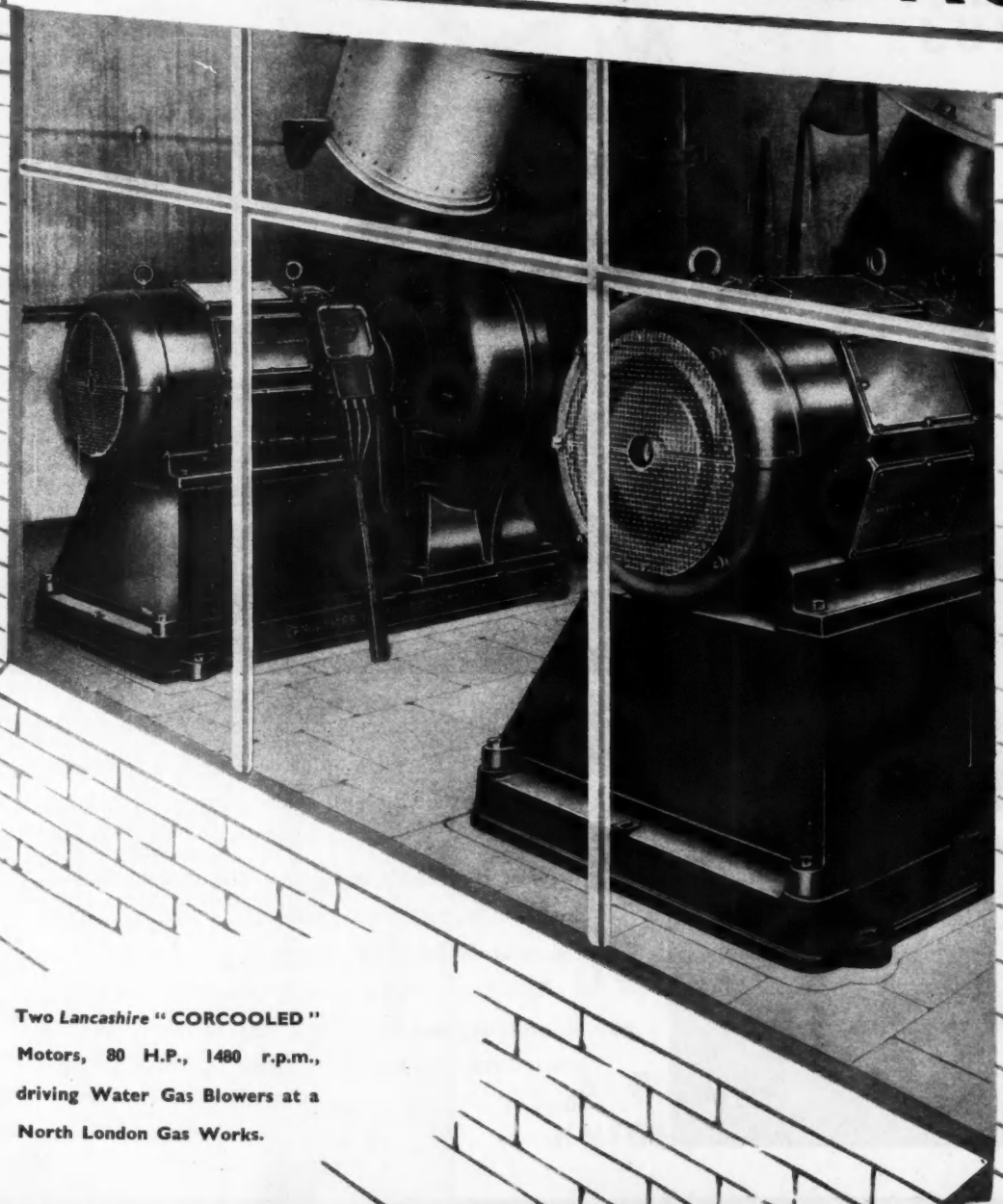

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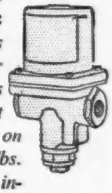

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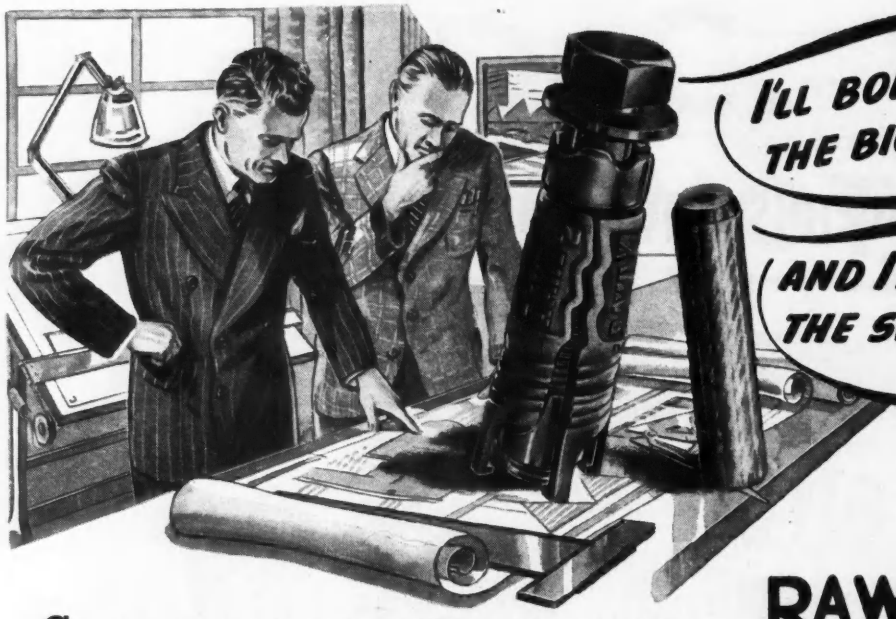

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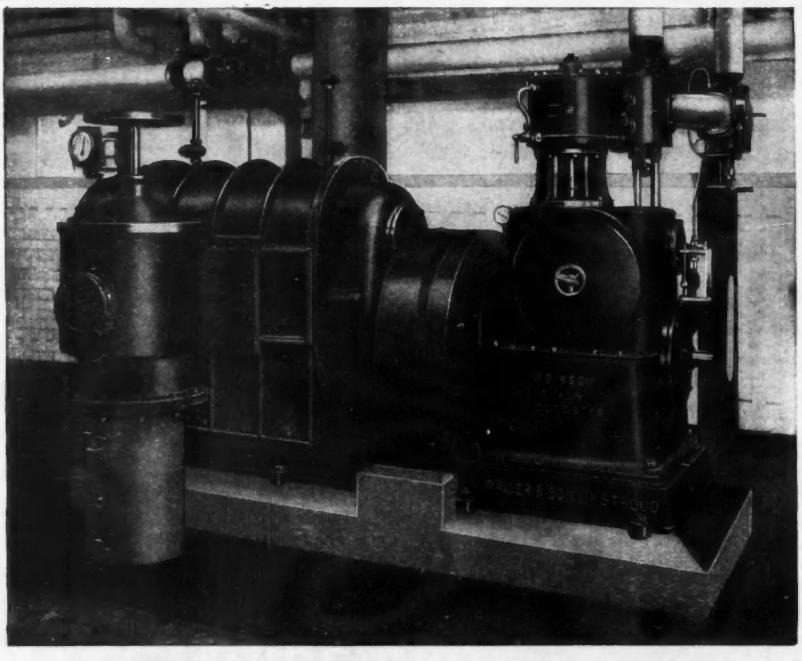

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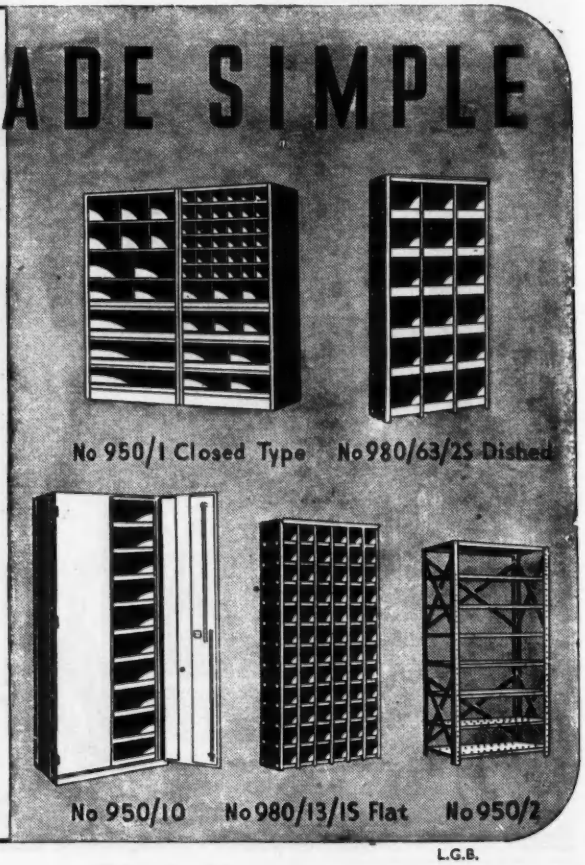

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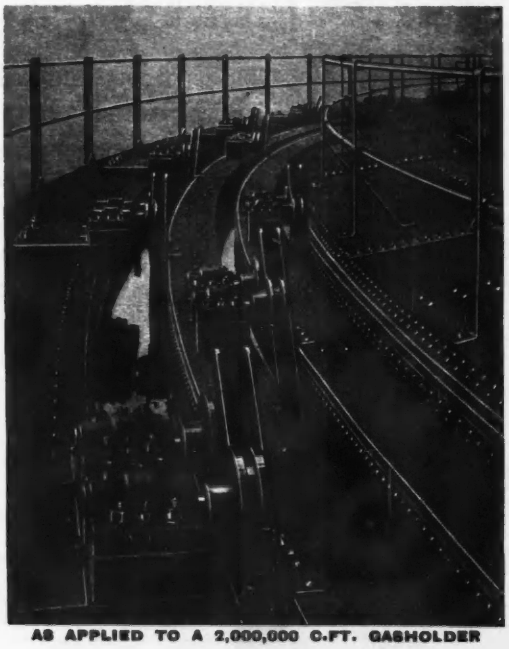

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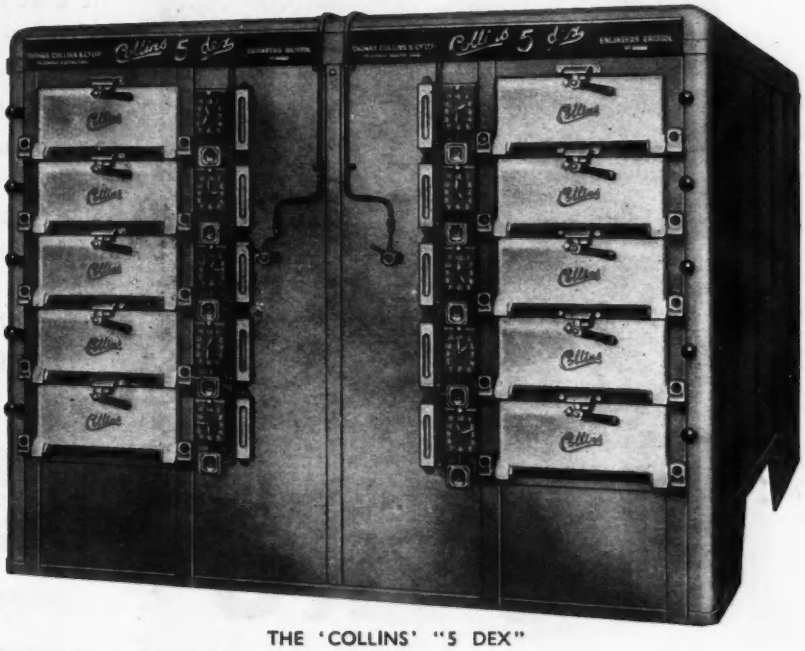

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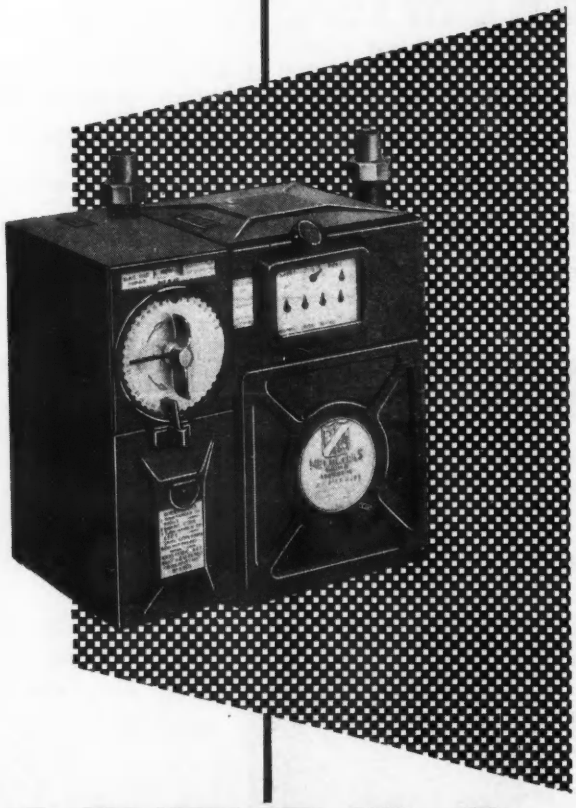

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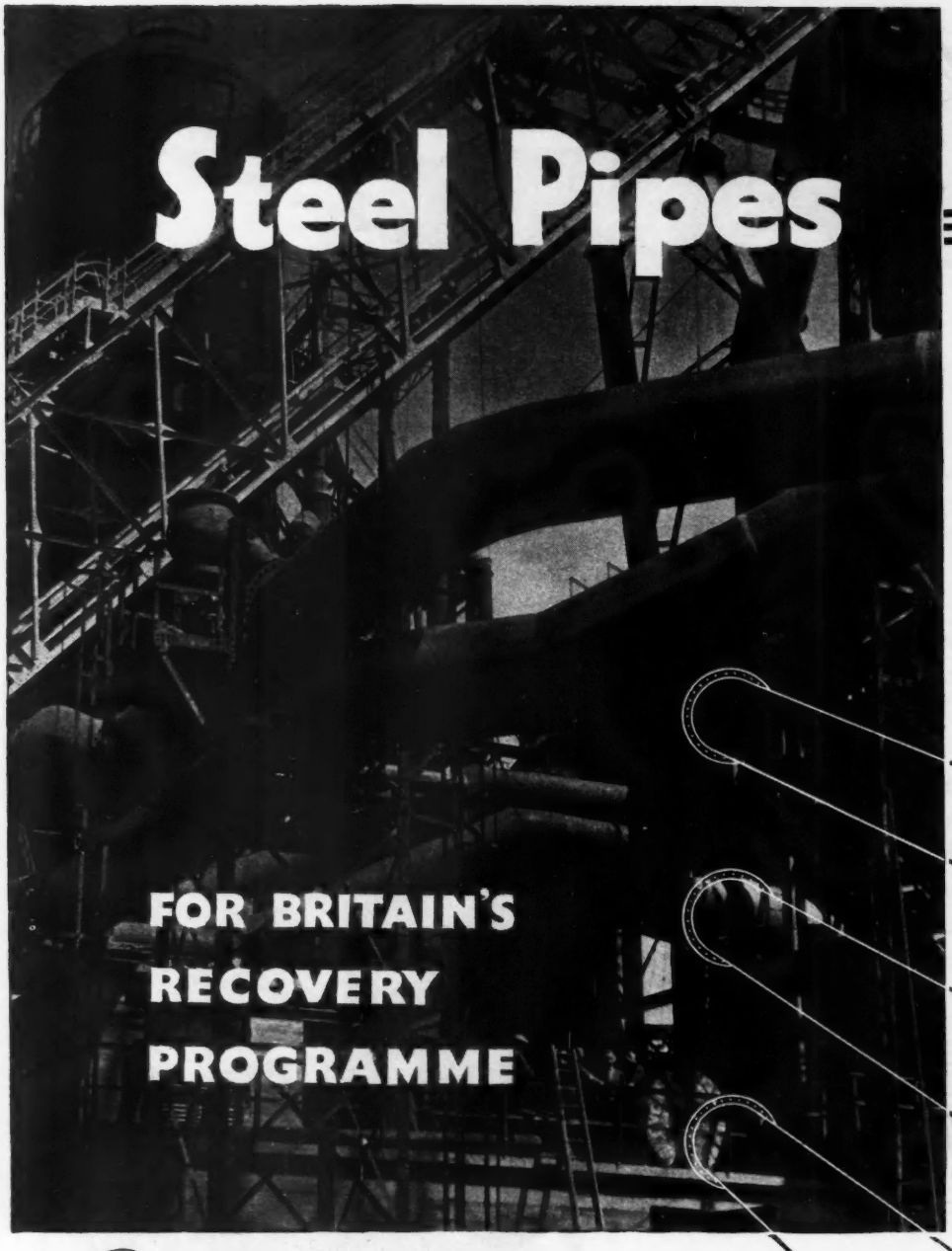

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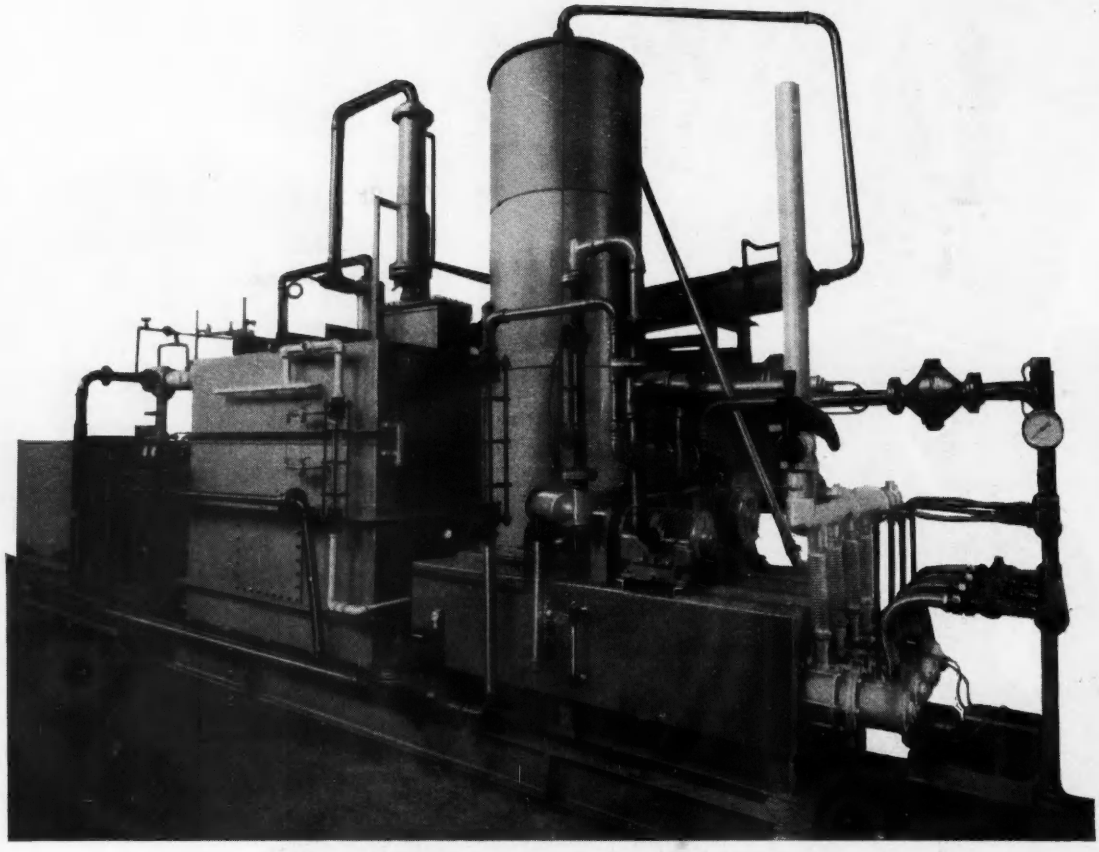

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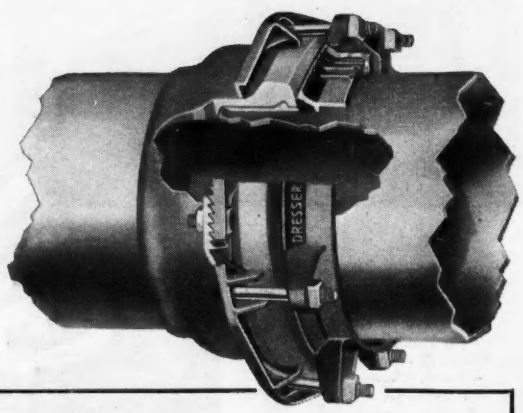

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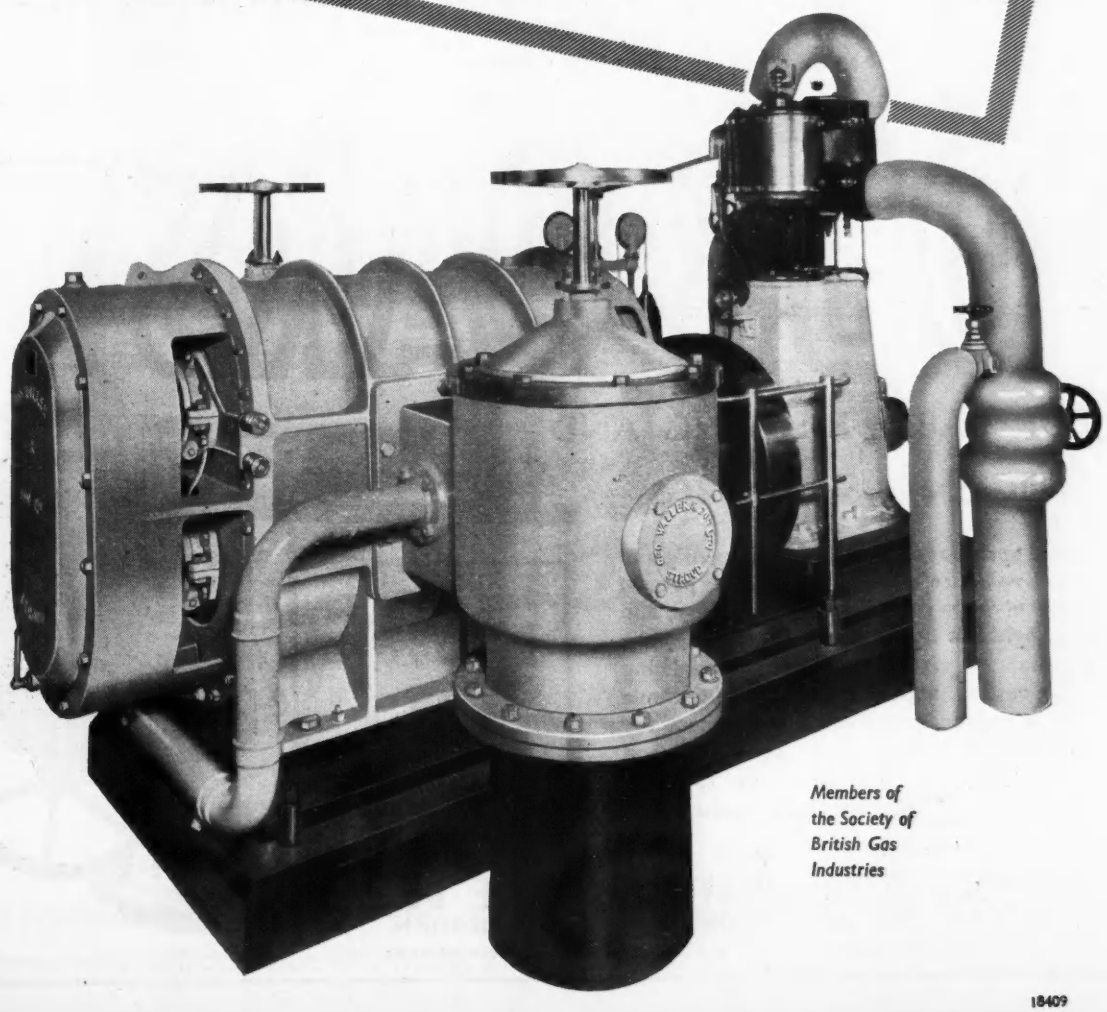

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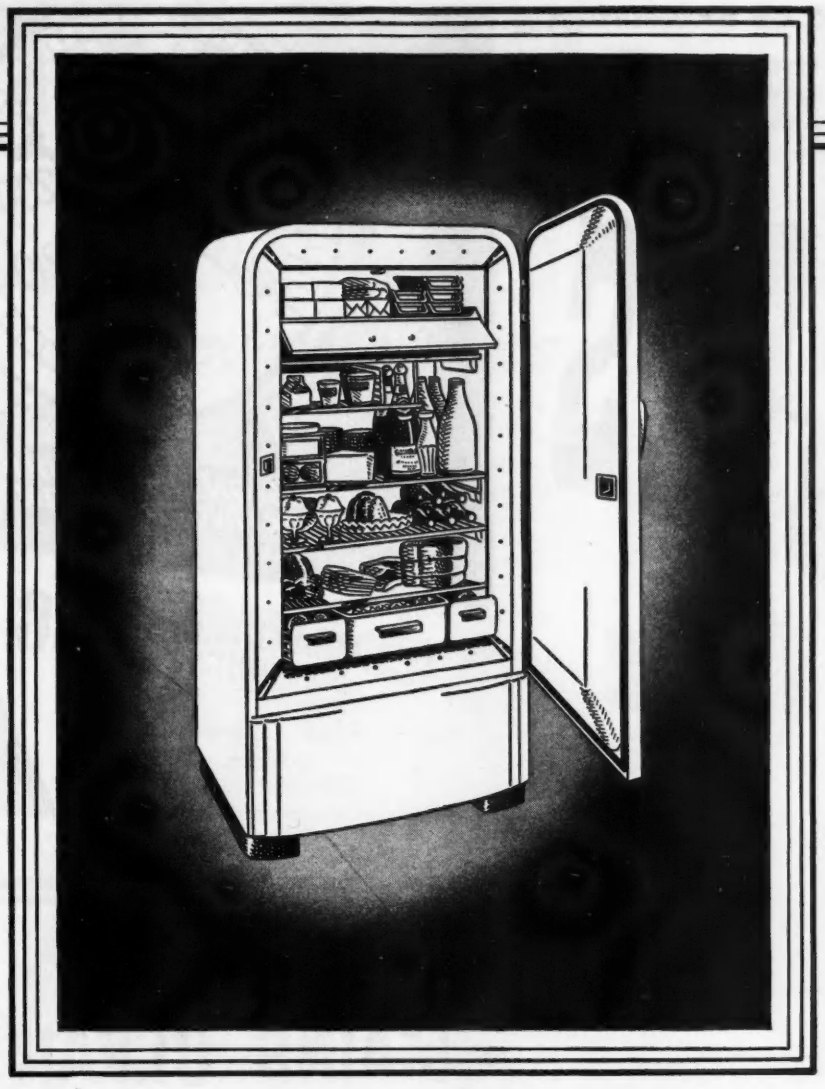

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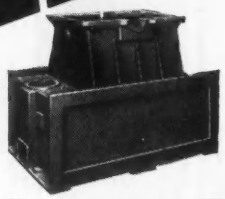

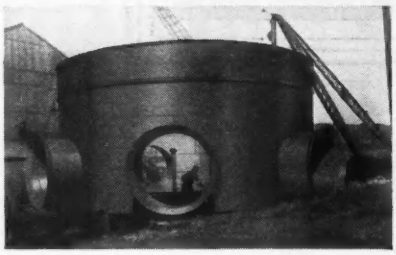

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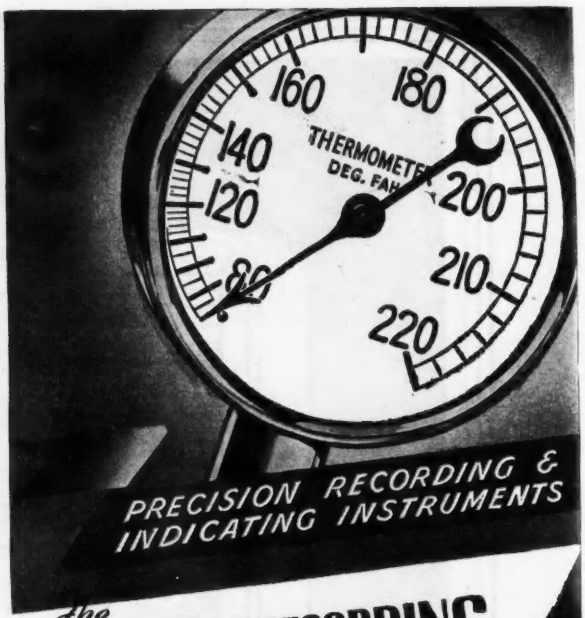

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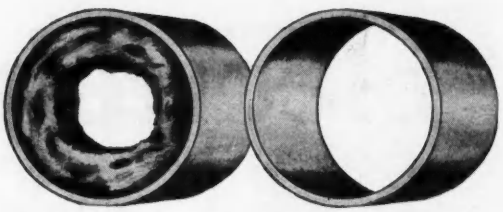

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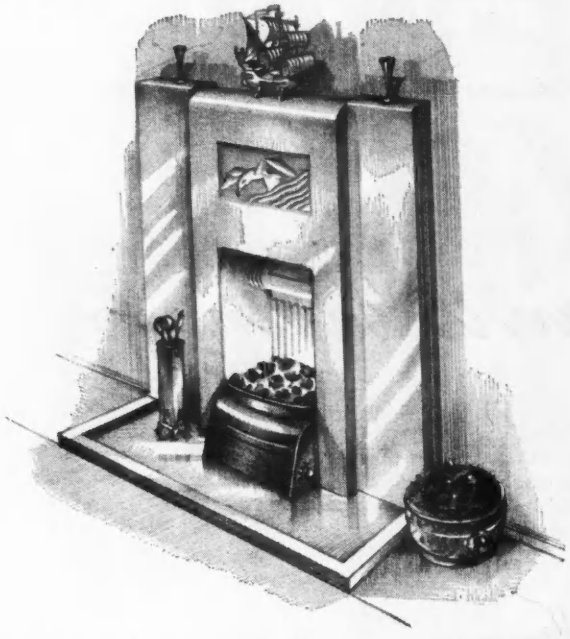

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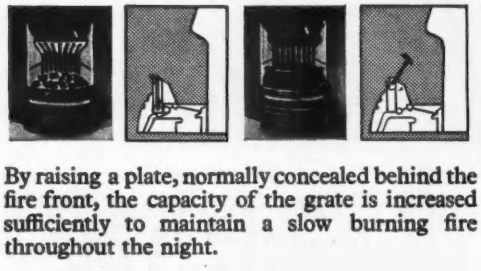

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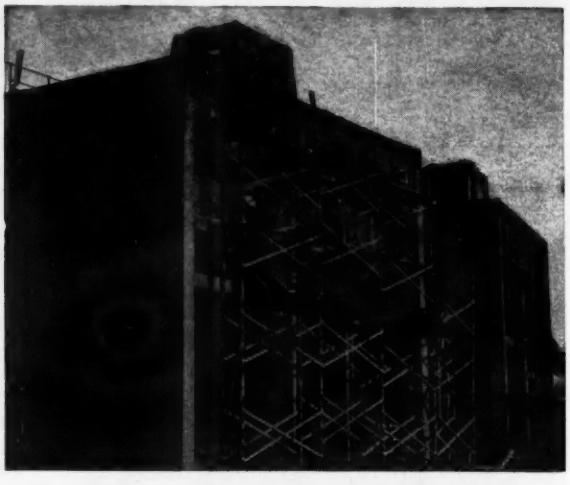

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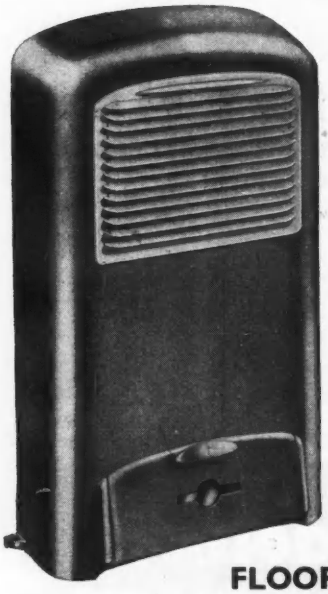

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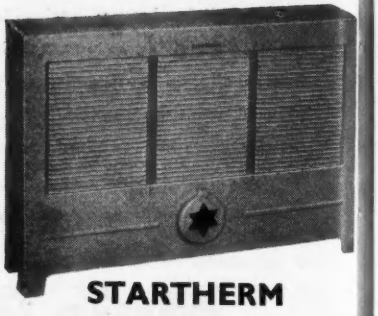

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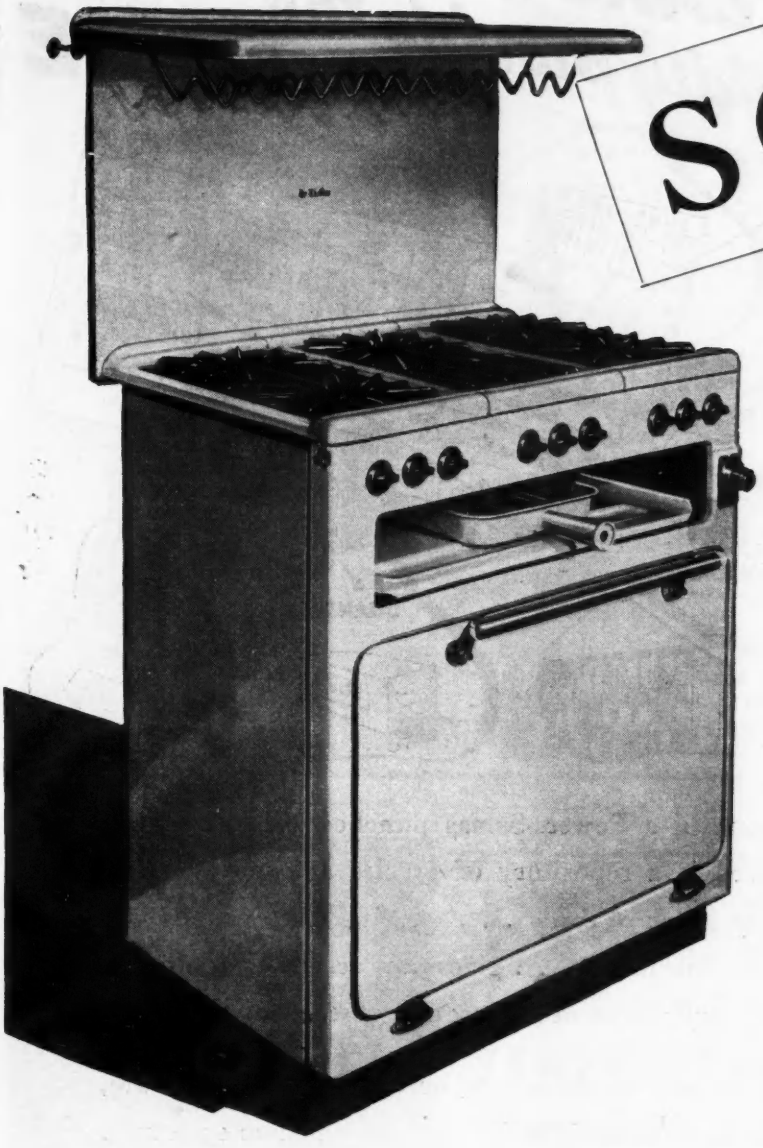

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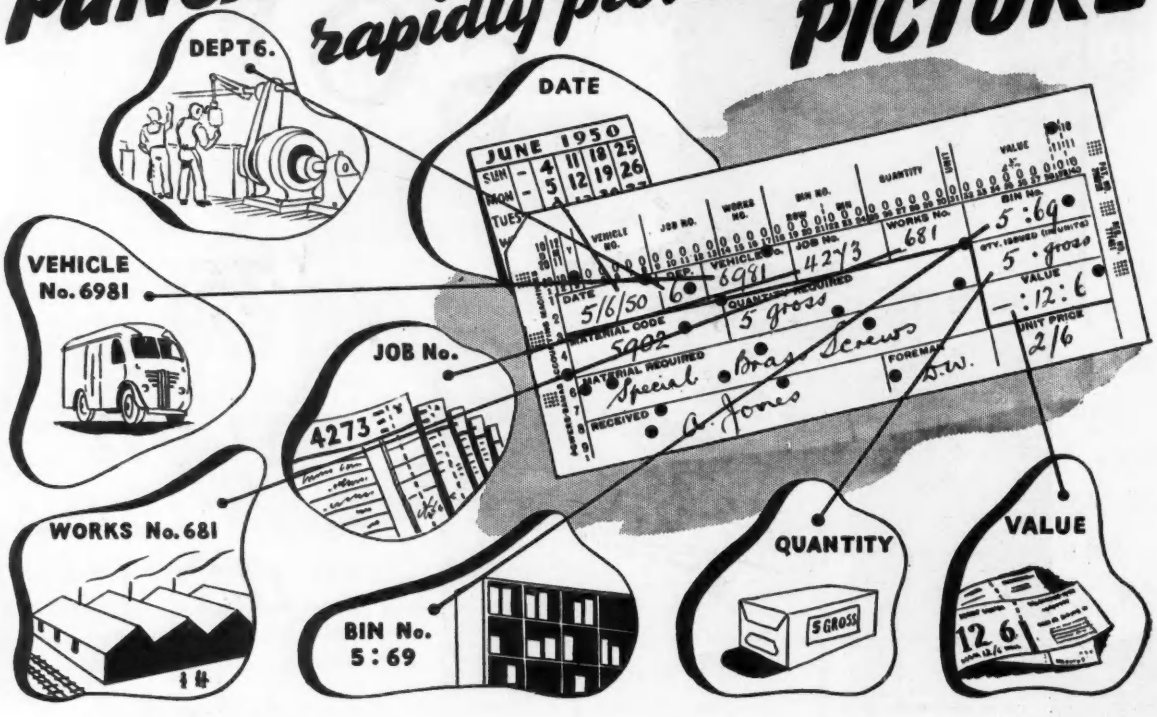

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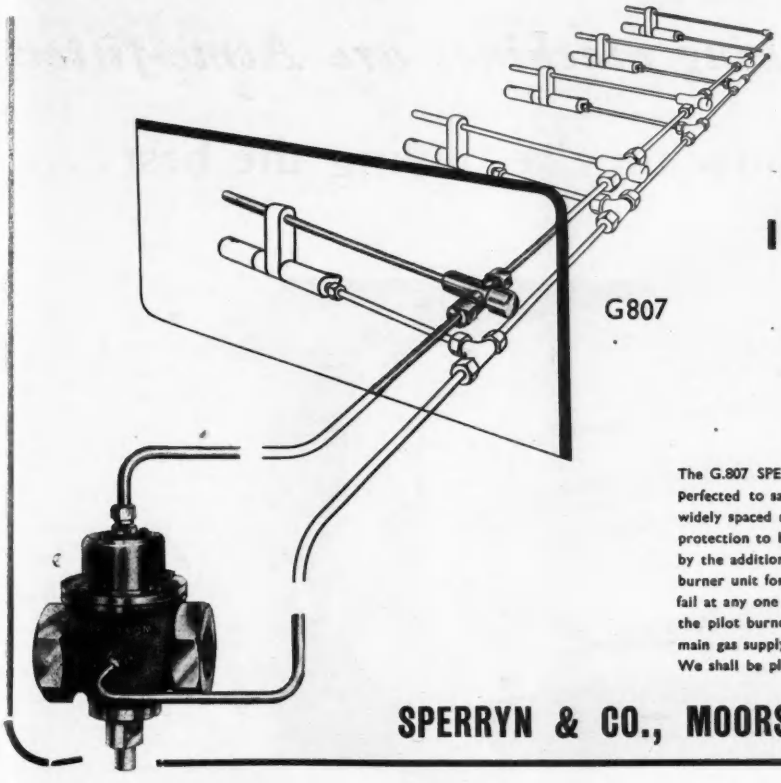

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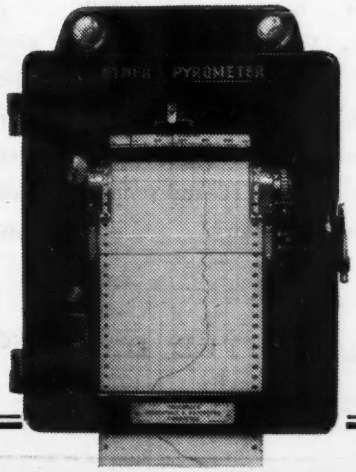

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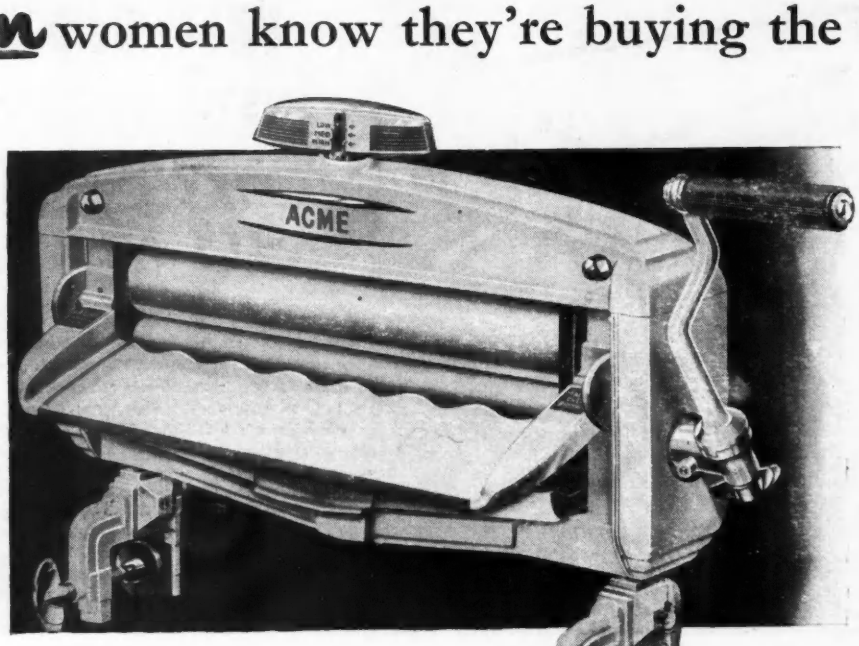

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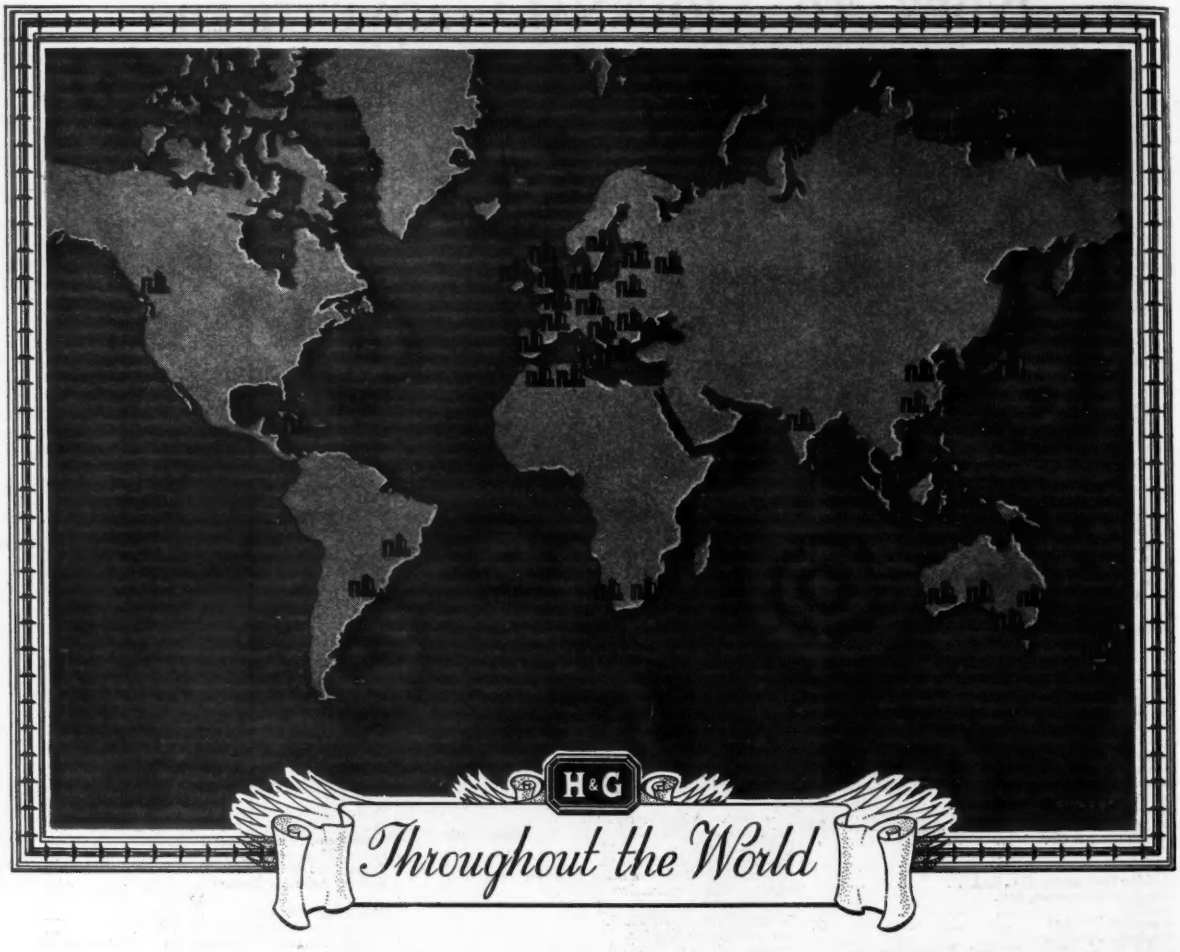

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103rd YEAR OF PUBLICATION

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GAS JOURNAL

VOL. 265. NO. 4570 103RD YEAR JANUARY 3, 1951

THE START OF THE YEAR

IT is to be feared that the gas industry is entering a difficult year. Looked at from the plant contractor's point of view the two main difficulties arise out of the growing shortage of certain raw materials and the persisting shortage of skilled labour, particularly of draughtsmen, accentuated by the general immobility of the population. It was to be expected that the re-armament programme would result in the diversion of a considerable proportion of the available mild steel from industrial production; but it was not expected that this would be so great or so soon. Rolled steel sections in the common categories were, nine months ago, obtainable in six to eight weeks; now the promise of delivery is 12 months or more, while large sections are still more difficult. It is feared that this stringency, while no doubt partly due to the changes in production at the rolling mills, from commercial to war-like purposes, is largely due to panic buying. It is felt that the Gas Council should use its influence with the Minister to see that the gas industry gets the proportion of mild steel sections and plates to which its importance, even to the armament industries themselves, entitles it. Refractories and other materials are not yet seriously affected, though any shortage of coal would immediately reduce the production of refractories and other ceramic materials.

The persisting shortage of houses is having a serious effect on the mobility of draughtsmen and other skilled personnel. Men and women in this category are showing the greatest reluctance to move from their home towns. So much is this so that enginering companies are finding it necessary to set up branch drawing offices in large centres of population away from headquarters. In this way the arrears of drawing office work, already considerable, are being kept in bounds but at the cost of some delay in the completion of the work. Do these difficulties call for some modification in the programme of work before the industry? For example, renewal, reconstruction, and modernisation of existing plant will give increased gas-making capacity with the minimum requirement of new steelwork; they should therefore, in cases where they are necessary in themselves, be given priority over new construction. Another suggestion, more difficult of application, is that new construction should be generally simplified and particularly restricted to existing designs, leaving elaboration and innovation to more favourable times. It is recognised of course that there is a grave danger here of impeding progress and development, but it is felt that the new design should be put into one or two of the new constructions only. There are far too many instances of innovations being called for in several new installations even before they have definitely reached finality in design.

In the application of gas to industrial and domestic needs we suggest that a somewhat similar caution might be exercised. While we would not go so far as to say that no new loads should be accepted, the rule could be reasonably laid down that new appliances should be installed only when it can reasonably be shown that they will achieve an overall coal saving. And this brings us to the biggest problem of all—that of a national fuel policy. Is the gas industry putting anything like the effort it should in pushing its demand for the formulation of such a policy? The solution 'freedom of choice,' even if it were implemented, which it is not, is not nearly enough. It merely shifts the allocation of the fuel to the job from technicians, who cannot agree, to the public, who are not in possession of sufficient knowledge and training to make a wise decision. It is past high time that the Minister of Fuel and Power should call his technologists together and come to a decision on such questions as what coals should be reserved for carbonisation and what types for combustion, and what duties should be allocated to gas, to electricity, to coke, to raw coal, and to oil. Not until these questions are settled can there be any great realism in the drive for fuel economy—a term which should always be expressed in terms of coal efficiency. These are comparatively short-term questions. When they are satisfactorily dealt with the fuel and power industries and industry generally should go all out for the saving of 80 mill. tons of coal per annum, to which Mr. Oliver Lyle has pointed the way.

It is impossible to approach the question of coal supply without pessimism. In the recent debate in the House of Commons there was not a glimmer of hope that any great

increase in quantity available per annum, let alone any reduction in price, is in sight. Shall we within a few years reach the point where the gross quantity of coal raised per annum will be no more than that 150 mill. tons which, as it was pointed out some time ago, is the quantity which can be raised at a reasonable price? In any case the unbroken run of manpower reduction is not likely to come to an end soon. The over-riding problem at all levels is how best to utilise the quantity and quality of the coal which is made available.

COKE

IN his paper 'The Production of Domestic and Industrial Coke,' presented at a recent meeting of the Institute of Fuel in Manchester, Mr. T. Nicklin, Production Engineer to the North Western Gas Board, essayed the task of conveying to an audience of fuel technologists, not gas engineers, a complete picture of this important and useful smokeless solid fuel. He is to be congratulated upon the achievement of a considerable measure of success. Placing the emphasis on production rather than on utilisation, he was able, within the compass of one paper, to display the wide range of properties with which coke can be manufactured to suit the many purposes it can serve in the industrial and domestic fields. In a brief historical introduction it was necessary to point out to such an audience that the revenue from the sale of coke has come to have a decisive influence on the price at which gas can be sold. Today, the price of coke is inflated by the shortage of coal, but even so the statement that the revenue from coke sales is almost as great as that from the sale of gas was somewhat misleading without some indication that it referred, as we presume it did, to all the coke produced including, that is, that made in coke ovens for metallurgical and other purposes.

The standard tests for the assessment of the properties of coke were very briefly set out, principally the critical air blast test for combustibility properties and the shatter test for physical strength. This section would have been improved by a comparative table showing values obtained in these tests with the several varieties of coke and, perhaps, other solid fuels, instead of leaving to the reader the task of picking them out from the rest of the paper. Metallurgical cokes, it is stated, have a C.A.B. around 0.08 cu.ft. per minute, horizontal coke around 0.05. We see no values for vertical retorts of either type. The statement that 'the most ideal figure for domestic use is around 0.03 cu.ft. per minute' appears to need some qualification, as, for instance, whether it is used in the open fire or in the closed stove. It would have been particularly useful to have given this figure for the cokes used in the open-fire tests so fully and admirably reported later in the paper. The properties desirable in cokes for industrial and domestic purposes were set out at some length. Here again it would have been well to have differentiated between the open fire and the closed stove. A high bulk density, for example, has some value for the latter, especially when the fuel space is cut down to such a fine point, in the effort to keep down the cost of the stove, as to make it difficult to store in it enough fuel to last through the night. These appliances, indeed, would generally be improved by the provision of somewhat larger fuel space and by better-fitting air controls. But in the open fire high bulk density is of no great advantage, especially as it is generally associated with low ignitibility and related properties. Mr. Nicklin has himself admitted that the best that can be done is to compromise between C.A.B. and bulk density.

The most desirable property of all, that of low ash content, is unfortunately to all intents and purposes entirely out of the control of, at any rate, the gas engineer. It is a definite function of the ash content of the coal—and he has to take what coal is available to him. Mr. Nicklin did well to wind up his paper with a brief account of the latest development of coke burning technique—that of the down-jet furnace. It might with advantage have been rather more emphasised that this is a method by which the inconvenience of the presence of ash in coke is most effectively countered.

A large section of the paper was devoted to a discussion of the factors affecting the properties of coke, the nature of the coal from which it is made, its origin, size, and preparation, the carbonising plant in which the coke is produced, its quenching, handling, and grading. The four main carbonising systems, horizontal retorts, continuous and intermittent verticals, and the coke oven, were adequately described and very well illustrated. Enough was said about handling and grading to convince such an audience as this that the carbonising engineer takes these very seriously. The need for brevity marred some passages. For instance, belt conveyors are preferred for coke transport not so much because 'their life is high and maintenance low,' as because coke is thus conveyed with the minimum of breakage and loss in transit. For the same reason the vibratory screen is to be preferred, when arranged in the correct sequence, to any form of screen which does not take off the larger sizes first. The primary scalping screen can make up for some lack in this respect. It does obviate the evil of shuffling the larger grades over the full length of a screen after the breeze is supposed to have been taken out, making more breeze, that is, as it goes. Cut coke may have some superiority, but there is seldom enough of it to satisfy the demand for the smaller grades, without mixing it with uncut coke. The claim that 'fine breeze' can be satisfactorily gasified in the mechanical producer, yielding a 'very cheap' gaseous therm, is a brave one—but it is still, we suggest, open to question. The gasification of de-dusted breeze in the mechanical producer may, however, be sufficiently successful for all practical purposes.

To round off the paper, two examples only were selected for description from the many and varied uses of coke, one, the open coke fire, in the domestic field, the other, the down-jet furnace, in the industrial. Both served admirably to display the qualities of this fuel. In regard to the former, particularly, the facts were well brought out. The two conclusions which made the greatest impression on our mind, and we trust on those of Mr. Nicklin's audience, were (a) that gas cokes have the highest radiant efficiency of any solid fuel, and (b) that the best coke size, 1 in. to 1½ in., is precisely that size which is most readily and plentifully produced in almost every type of gasworks carbonising plant after handling and grading.

THE 'SUPER INCH'

FROM a land of such vast areas as the United States one has come to accept breath-taking figures almost as a matter of course. Yet even in a country of records in all three dimensions one cannot escape a feeling of genuine astonishment at the stupendous figures involved in the collection and distribution of natural gas. Mains extend over distances which cannot be measured by a single journey in these islands of ours. Indeed, from Lands End to John o' Groats *and back* would scarcely cover the length of some of the mains lately put into commission. One such project is briefly mentioned on another page of this issue, which culminated in the crossing of the Hudson River with nearly 5,000 ft. of 26 in. pipe. Another is the Pacific Gas and Electric Company's scheme. This story of harnessing the natural gas and piping it half across a continent, from the deserts of Utah and Arizona to centres of population 1,600 miles away on the Pacific coast, reads like an epic of the last century—when perhaps the pioneering forebears of the present gas engineers drove the first railways in the reverse direction.

After the San Juan field is connected next autumn deliveries will reach the enormous level of 400 mill. cu.ft. a day. The Topock-Milpitas section of the main is 501 miles long and 34 in. diameter—the largest pipe ever built for the high-pressure transmission of natural gas. Because of its exceptional size it was nicknamed the 'Super Inch.' The Company entered into an agreement with the El Paso Natural Gas Company for gas to be delivered at the State border, which happens to be the middle of the Colorado River. The elevation at this point is approximately 500 ft. The highest point on the system is about 4,600 ft. The means employed to construct this main were themselves exceptional in their scope. For example, two 32½ ton trenching machines were in use—the largest of their type ever built—opening a trench 44 in. wide by 5½ ft. deep at a rate of a mile or more a day each. Over a period of 18 months steel plate from the Geneva plant in Utah was shipped to South San Francisco for fabrication, and then daily, for months, trains of 25 to 40 cars left the factory loaded with pipe. The transportation of more than 200,000 tons of pipe, fittings, and wrapping materials was involved in the construction of the 34-in. main. The hauling contract is believed to have been one of the largest in the history of trucking in California. The diesel tractor and trailer units were modified to handle the exceptional loads, for a single 30-ft. length of 34-in. pipe weighs 1½ to 2½ tons, depending on wall thickness. The double or triple lengths of pipe delivered were field-welded into sections of 2,000 to 4,000 ft. before being lowered into the trench.

These are just a very few of the truly amazing facts and figures quoted by the *American Gas Journal* in an illustrated article on this trans-continental pipeline, which by now is probably already delivering 150 mill. cu.ft. a day to meet a phenomenal growth in demand from the swelling population of America's fastest growing state.

MAKING ENDS MEET

A STANDARD difference of 37½% between the price paid to the manufacturer and that charged to the consumer for gas appliances was queried last October by the North Thames Gas Consultative Council. At a meeting last Thursday a reply was received from the North Thames Gas Board that 'General Consumer Service' comprised many items attributable to the sale of appliances on cash and hire purchase terms, among which were storekeeping, warehousing, handling, transport, builders' discounts, publicity, market research, bad debts, departmental, divisional, and district facilities, and industrial and domestic centres. It was further pointed out that when all appliances were subject to rigid price control the Board of Trade approved 37½% as a reasonable charge for overheads. What the Board did not explain, however, and what members of the Council were anxious to know, was whether in fact the 37½% exactly covered the overheads or whether there was a loss or profit. Councillor E. Bayliss, Chairman, told the Council that although the 37½% on cost had become standard for the North Thames area it was not common to all the areas, but the whole question was being examined at national level by the commercial managers of the 12 boards, and he suggested that the Council might let the matter rest until their report had been issued. So long as a gas board provides an efficient service and just makes ends meet, it does not seem to matter so much nowadays as in the private enterprise era exactly how it meets its overheads. It could either provide appliances free of charge and debit the cost to dearer gas, or keep the price of gas low and charge dearly for the appliances. A middle course is obviously to be preferred, bearing in mind that in any case gas appliances (with few if any exceptions) must be obtained through the area boards and are not, like a wide range of electrical equipment, on sale over the counter in private enterprise shops. Another matter raised last Thursday was the tendency to encourage 6d. and 1s. slot meters in preference to the older 1d. slots. While agreeing in principle, the Council decided to seek more information from the Board, particularly with a view to removing an impression on the part of some consumers that the closing of the 1d. slots was an arbitrary action on the part of individual fitters. Councillor Bayliss commended to the Press an appeal from the Minister of Fuel and Power for the utmost economy in the use of gas during the winter. Asked how soon he thought the report and accounts of the Board for the year ended March 31, 1950, would be published, the Chairman said 'in about a month from now.' Each member of the Council will receive a copy. It was announced on Monday that in view of the coal shortage, Mr. Philip Noel-Baker, Minister of Fuel and Power, is contemplating a broadcast appeal for fuel economy to impress upon everybody, in homes and industry, the great need for the avoidance of waste in electricity, gas, and coal.

Personal

NEW YEAR HONOURS

Notable among the New Year Honours announced on Monday was the conferment of the C.B.E. on Mr. **Cecil H. Chester,** O.B.E., M.I.MECH.E., Chairman of the South Western Gas Board. Another recipient of the C.B.E. was Mr. **W. L. M. O'Connor,** Director of Carbonisation, National Coal Board.

Mr. **J. E. Stanier,** G.M., M.I.CHEM.E., Divisional Manager, North Staffordshire Division, West Midlands Gas Board, received the O.B.E.

Mr. **G. R. Bulwinkle,** A.M.I.MECH.E., who recently retired from the position of Engineer at the Vauxhall Works of the South Eastern Gas Board; Mr. **Bernard Clarke,** J.P., Sub-Divisional Manager of the South Lincolnshire Sub-Division, East Midlands Gas Board; and Mr. **L. Clegg,** Regional Fuel Engineer, Ministry of Fuel and Power, received the M.B.E.

The British Empire Medal (B.E.M.) was awarded to Mr. **W. Binnie,** General Foreman, Aberdeen gasworks; Mr. **F. Bridgwater,** Head Mainlayer, Bristol Sub-Division; Mr. **J. W. Chaney,** Staff Foreman, Regents Park, North Thames Gas Board; Mr. **C. W. Clubley,** Works Foreman, Spalding, East Midlands Gas Board; Mr. **A. Hodge,** Shift Foreman, Cleckheaton gasworks, North Eastern Gas Board; Mr. **E. R. Jones,** Works Superintendent, Colwyn Bay, Wales Gas Board; and Mr. **W. H. Wingham,** lately Works Foreman, Haywards Heath gasworks, South Eastern Gas Board.

◇ ◇ ◇

Colonel **W. M. Carr** has resumed the Chairmanship of the United Kingdom Construction and Engineering Company, Ltd., and also that of Begwaco Meters, Ltd.

◇ ◇ ◇

Councillor **G. H. Clarke,** of Wolverton (Bucks.), and Councillor **F. Perry,** of Moorends, nr. Doncaster, have been appointed members of the East Midlands Gas Consultative Council.

◇ ◇ ◇

Dr. **Alexander Fleck** has been appointed a Deputy Chairman of Imperial Chemical Industries as from January 1. Dr. Fleck has spent all his working life in the chemical industry, and has been with I.C.I. since the Company was formed. He was appointed a Director in 1944.

Mr. **J. P. Elliott,** F.C.I.S., F.A.C.C.A., A.C.W.A., the Secretary and Chief Accountant of Davey, Paxman & Co., Ltd., Colchester, has been appointed to the Board of the Company.

◇ ◇ ◇

Mr. **M. E. Frost,** Group Manager of the Coalville, Ashby-de-la-Zouch, Measham and Ibstock gas undertakings of the East Midlands Gas Board, has been appointed District Manager at Long Eaton, as from January 1. Before going to Coalville in 1942 Mr. Frost was Manager at Narborough.

◇ ◇ ◇

Mr. **R. S. Pound,** who has served George Wilson Gas Meters, Ltd., in the North of England for the past 10 years, is relinquishing part of his duties, though he will act in an advisory capacity. Mr. **R. B. Reynolds** is taking over from Mr. Pound in the capacity of Area Sales Manager with headquarters at the firm's Manchester Works, 32/34, Cannel Street, Ancoats, Manchester, 4.

Obituary

Mr. **Leslie W. Dunn,** Southern Representative of Abbott, Birks & Company, Ltd., died in London on December 16. He was the son of the late Mr. Walter T. Dunn, Secretary for many years of the Institution of Gas Engineers.

◇ ◇ ◇

Mr. **David Jacobs,** Senior Sales Representative of J. H. Robinson & Co. (Liverpool), Ltd., since 1940, and Sales Director since last March, died at Birmingham on December 14. He had been ill since October and had been taken to Birmingham for special treatment. He was widely known and esteemed in the gas industry.

◇ ◇ ◇

Mr. **Robert Osborne,** late Managing Director of Le Bas Tube Company Ltd., died on December 19, at his home at Worthing, aged 81. Mr. Osborne joined the late Mr. Edward Le Bas in 1891 at the age of 22 as a representative, particularly for the sale of GF malleable iron tube fittings and steel tubes. On the formation of Le Bas Tube Company in 1925 to deal with these products, Mr. Osborne was appointed Managing Director, later being associated with the erection of Britannia Iron & Steel Works at Bedford, for the manufacture of GF fittings. He retired in March, 1939, having thus been actively associated with the Le Bas organisation for 48 years.

◇ ◇ ◇

WILLIAM CASH, J.P., F.C.A.

The gas industry and also the world of accountancy has lost a well-known figure in the death on Christmas Day, in his 85th year, of Mr. **William Cash,** J.P., F.C.A. Educated at Haileybury, Mr. Cash turned to accountancy for a career and became in 1889 a partner in the firm of Cash, Stone & Co. He was a member of the Council of the Institute of Chartered Accountant since 1908 and was elected Vice-President in 1920-21 and President in 1921-22 and 1922-23. During the first world war he carried out important work for various Government departments and was one of the referees appointed under the Munitions Act, 1915. Mr. Cash became early associated with the gas industry, for it was in 1891 that he was appointed Secretary of the Bournemouth Gas and Water Company, succeeding 18 years later to the Board and to the Chairmanship in 1918. He was also Chairman of the Croydon Gas Company, the Barnet District Gas and Water Company, and the South African Lighting Association, with all of which companies he had been connected for round about half-a-century. He was a Director of the Brighton, Hove, and Worthing Gas Company and other commercial undertakings. He will be particularly remembered in the industry for his activities in connection with the British Commercial Gas Association, of which he was a member since its early days and President in 1932-33. He was Chairman in 1921 of the Southern District Executive Board of the National Gas Council. He was also President of the British Waterworks Association; Chairman of the Canterbury Diocesan Board of Finance, and Treasurer of the Archbishop of Canterbury's New Churches Fund. He was a Croydon man and for many years was treasurer of the local temperance movement and churchwarden of St. Matthew's Church. He was a Justice of the Peace for the county of Surrey. William Cash was a staunch supporter of co-partnership in the gas industry; he had outstanding experience in Parliamentary Committee Rooms and great knowledge of company administration.

Mr. W. J. SANDEMAN writes:—

The death of William Cash has taken from us another of the great leaders of the gas industry prior to the blight of nationalisation descending upon it. I was closely associated with Mr. Cash for over 45 years and learned to respect and admire his great abilities and his kindly consideration for all the employees. As Chairman of the Board for the last 27 years of the Company's existence his wise leadership contributed very largely to the success of the Company. It was entirely due to his initiative that the staff pension fund was extended some years ago to include all co-partners. I, in common with many of the old employees, feel we have lost a good friend who always had our welfare at heart. He was kindness itself to me and was the last surviving member of the Board as constituted when I joined the Company.

Diary

Jan. 8.—Women's Gas Council: Executive Committee, 1 p.m.; Special General Meeting, 3.15 p.m., Gas Industry House.

Jan. 9.—Midland Junior Gas Association: 'Distribution of Gas in a Mining Area,' F. C. Hawkyard (Cannock). Staff Mess Room, Birmingham, 6.30 p.m.

Jan. 10.—Scottish Junior Gas Association (Eastern District): Visit to Durie Foundry, Leven.

Jan. 12.—London and Southern Junior Gas Association: 'The Performance of Continuous Vertical Retorts,' C. H. Lewis, 178, Edgware Road, W.2, 6.30 p.m.

Jan. 12.—Scottish Junior Gas Association (Western District): Paper by C. Campbell (Dawsholm). Royal Technical College, Glasgow.

Jan. 13.—Western Junior Gas Association: Visit to Bideford Works and short papers by Student Members.

Jan. 15.—Eastern Gas Consultative Council: Connaught Rooms, 2 p.m.

Jan. 16.—Institute of Fuel: 'Transport and Storage of Coal.' L. Locket. Institution of Mechanical Engineers, Storey's Gate, St. James's Park, S.W.1, 5.30 p.m.

Jan. 17.—Eastern Gas Board (Cambridge Division) Salesmen's Circle: 'The Divisional Installation Manual,' S. Halls (Distribution Superintendent, Cambridge).

Jan. 19.—Eastern Junior Gas Association: 'About the Works,' L. W. Jarrett (Nottingham). Peterborough.

Jan. 20.—Yorkshire Junior Gas Association: 'Concerning Carbonisation,' R. K. Atkinson (Assistant Works Manager, New Wortley Works, Leeds). Wakefield.

Jan. 24.—Industrial Gas Development Committee: Gas Industry House, 9.30 a.m.

Jan. 24.—London and Southern Junior Gas Association: Visit to the works of Electroflo Meters Co., Ltd., Park Royal.

Jan. 25.—North Thames Gas Consultative Council: Westminster City Hall, Charing Cross Road, 2.30 p.m.

Jan. 29.—West Midlands Gas Consultative Council: Dudley Room, Queen's Hotel, Birmingham, 2.30 p.m.

Jan. 30.—London and Southern Section, Institution of Gas Engineers: 'Water Pollution,' P. Wedgwood, M.SC. (Production Engineer, Watford Division). Institution of Gas Engineers, 17, Grosvenor Crescent, 2.30 p.m.

The third edition—the first was published in 1929 and the second in 1938—of 'Standard Specifications for Benzole and Allied Products' will be available very shortly. A committee fully representative of the whole industry is responsible for the book, and the views of users of the products are given every consideration. Priced at 15s. 9d. post free, it will be obtainable on a pre-paid order from the National Benzole Association, Wellington House, Buckingham Gate, London, S.W.1.

TWELVE-MILE LINKAGE

New Yorkshire Coke Oven Installation

The December 15 issue of the 'Iron and Coal Trades Review' contained the following notes on the supply of coke-oven gas from Orgreave to Stocksbridge in Yorkshire—a distance of 12½ miles through 18 in. steel pipes.

THE works of Samuel Fox & Company, Ltd., Stocksbridge, uses, for many metallurgical purposes, coke oven gas generated 12½ miles away at the coke ovens of another works of United Steel Companies, the United Coke & Chemical Company, Ltd., at Orgreave.

This long-distance arrangement was decided on during World War II to enable the firm to close down the Stocksbridge coke ovens which had become uneconomical when the Stocksbridge colliery was worked out. Purified gas from these ovens supplied domestic and street lighting fuel to the urban districts of Deepcar and Stocksbridge, and this service had to be taken into account when the new installation was being planned. The plant has now been working successfully for about a year; Husband & Company, of Sheffield, were the consulting and civil engineers.

The 12½ mile pipeline from Orgreave to Stocksbridge is of 18 in. steel pipes. The optimum capacity is 46 mill. cu.ft. of gas per week, at a normal delivery pressure of from 8 to 10 lb. per sq.in. There is a tapping off the line where it passes through the works of Steel, Peech & Tozer, close to which it crosses the River Don on a lattice girder bridge.

At Stocksbridge, a gasholder, purification plant and distribution system have been installed to cope with any likely fluctuations of supply or demand. This plant is housed about half a mile down the Don valley from the main works, and those familiar with the valley in and near Stocksbridge will realise that its narrowness made it necessary to dig a site out of the side of the hill. About 90,000 cu:yd. of soil was removed. The gasholder has a capacity of 3 mill. cu.ft., and is a four-lift, spiral-guided type with a diameter of about 180 ft. There is also a battery of purifier boxes and the necessary steam, air and ammonia injection plant. The gasholder tank contains 6 mill. gal. of water, and puts the total load on the foundations up to 27,000 tons. It gave cause for anxiety, therefore, when trial borings made after the mass excavation revealed old mine workings immediately under the proposed site of the gasholder. However, it was finally found economical to take mass concrete piers down to the level of the lowest workings and to connect the piers with arched concrete reinforced with steel rejected for normal use because of inaccurate gauge. Accurate level observations taken before and after the gasholder tank was filled showed no differential settlement.

The gasholder is normally used as a reservoir for unpurified gas, from which crude gas can be boosted directly to the works, while other supplies can be fed through the purifiers before being boosted as purified gas straight to the works (largely for use in the stainless-steel plant) or to another gasholder at the other end of the works 2,700 yd. distant. The main function of this holder, which is 250,000 cu.ft. capacity, is to provide storage for Stocksbridge town supply. Deepcar, which is downstream from the control station, is supplied direct from the station itself. There is an automatic illuminated gas control diagram and panel at the control station within the booster and meter house building. Supply and delivery condition, flow, pressure and temperature are all indicated and recorded. The control diagram shows not only directions of gas flow and position of valves, but also the height of the two gasholders. Holmes-Connersville meters are used both for incoming and outgoing gas, and Rootes-type boosters both for crude and purified gas.

Four mains lead from the booster house, one of 18 in. dia. feeding crude gas, and three of 12 in. dia. feeding purified gas. These steel tubes have electrically welded sleeve joints, each weld and flanged joint on the four miles of pipework having been soap tested under an air pressure of 30 lb. per sq.in., after which the total length was subjected to a 48 hr. standing test at 50 lb. per sq.in. Constant pressure is maintained in the delivery mains, whatever the fluctuations in demand, by means of automatic pressure regulators operated by the Askania oil-jet system, acting on the brush controls on the variable-speed motors driving the boosters.

W.G.C. at Flavel's

The Coventry Branch of the Women's Gas Council recently visited the factory of Sidney Flavel & Co., Ltd., at Leamington Spa. Some 75 members were present and had a most interesting tour of the factory with guides who are specially trained for conducted visits of this nature.

Mr. Duncan Wright (Assistant Managing Director), in the absence of the Managing Director, Mr. W. Arnold Jackson, said that Flavel's were always particularly pleased to welcome ladies who used gas appliances, and he had hoped that the visit would be enjoyable and instructive.

Mr. F. M. Rogers (Sales Director) addressed the company after tea, and said that his Company was particularly interested in the views of housewives, as only by a cross-section of opinion from housewives throughout the country, together with guidance from the supply side of the industry, could makers of gas appliances really know what was wanted. He concluded by saying that Messrs. Flavels at all times went out of their way to encourage visits from organised bodies such as the various branches of the Women's Gas Council.

This remarkably striking Christmas window display appeared during the recent festive season in the principal gas showrooms in the Cambridge District, where the delightful scene attracted much attention.

The Engineers' Guild proposes to form an Edinburgh and East of Scotland Branch with a view to developing mechanical, electrical, and civil engineering interests in that part of Scotland.

Ninety Children were entertained at a party at the Coventry works of George Wilson Gas Meters, Ltd., organised by the Social Committee. Mr. F. C. Wilson, a Director (popularly known as 'Uncle Fred') filled the rôle of Father Christmas, and presents and seasonable entertainment were provided in the afternoon.

Derby Long-Service Awards

Six employees of the Notts and Derby Division of the East Midlands Gas Board have been presented with leather wallets by Mr. H. F. H. Jones, the Chairman. They included Mr. J. Pollard (aged 75), depôt foreman, who has been employed in the gas industry since 1894. Another recipient, Mr. C. H. Mosedale, administrative assistant to the divisional general manager, retired on March 31. He began with Derby Gas Light and Coke Company as general clerk in 1898 and rose to the position of accountant in 1929. He was elected to the board of directors in 1947 and when the undertaking was nationalised he became assistant to the manager. The other recipients were Mr. R. W. Porter, residuals sales officer at Derby; Mr. R. Spencer, distribution foreman at Derby; Mr. G. Johnson, water softener plant attendant at Litchurch; and Mr. F. Leadbeater, district inspector at Burton-on-Trent. The last two are still working.

'Workers' Playtime' Broadcast from Gasworks

FOR the first time in Wales, a 'Workers' Playtime' programme was broadcast from a gasworks—the new station at New Inn, Pontypool, on December 8.

The fitting shop had been cleared of most of its machinery, and the rail and road unloading platform made an excellent stage at one end. Here many of the 280 local gas workers—operatives, slot-meter collectors and office staff—spent half-an-hour of their lunchtime listening to a first-rate concert provided by Albert and Les Ward, two Cardiff boys who have made a name for themselves with their comedy numbers with guitar and effects; Jack Watson (impersonations of well-known stars of stage and screen); and Sylvia Robins, attractive young ballad singer, who was accompanied by James Moody.

Alun Williams, the compere, put the audience at their ease before the show went on the air, and the artistes afterwards said they could not have wished for a more warm-hearted, appreciative reception. At the end they joined with gusto in singing 'Pack Up Your Troubles,' the signing-off tune of 'Workers' Playtime.'

Among the audience were Mr. T. Mervyn Jones, Chairman of the Wales Gas Board, and Mr. John Powdrill, general manager of the Pontypool Undertaking. At lunch afterwards, Miss Louie Turner, chairman of the local gas and water welfare committee, presided, and also present, besides the artistes, were Mr. G. V. Davis (vice-chairman), Miss M. Price (secretary), Mrs. Lewis (treasurer), and members of the committee.

Northern Juniors

ON December 8 a Short Paper Meeting for the President's Prize was held at the Darlington works of the Northern Gas Board, under the Presidency of Mr. G. W. Perks, of Stockton.

The President's Prize is awarded annually for the best two papers submitted and a consolation prize in the form of a copy of the *Transactions* of the British Junior Gas Associations is awarded for the third paper. The three papers were read in succession at this meeting, followed by a discussion.

The paper to receive the first award was that by Mr. A. K. Stalker, of Sunderland, 'Considerations Governing the Installation of Steam Traps.' The second prize was awarded to Mr. W. E. Whitney, of Stockton, for a paper on the 'Conversion of Solid Fuel Central Heating to Gas Firing.' The third award was made to Mr. E. Sheldon, of Middlesbrough, who submitted 'An Outline of the Testing of Domestic Gas Appliances.'

A vote of thanks was proposed by Mr. G. E. Fryer, of Darlington, to the members who had read their papers at the meeting, and a vote of thanks was proposed by Mr. B. C. Smith, of Middlesbrough, to Mr. F. Wilson, Divisional General Manager of the Darlington Division of the Northern Gas Board, for the hospitality and facilities provided for the meeting. Response was made by Mr. Wilson, who stressed the desirability of juniors submitting papers expressing their personal points of view on various subjects and not being afraid of preparing contentious papers which would provide lively discussion.

Corby (Northants) Gasworks had a record day on December 4, delivering 411,000 cu.ft. of gas in 24 hours. Their previous best was 398,000 cu.ft.

LEEDS HEADQUARTERS TRANSFORMATION

Few people visiting, for the first time, the attractive Headquarters Offices of the North Eastern Gas Board, would realise that little more than a year ago this same building was nothing more than an Appliance Repair Shop and Store of the former Leeds Corporation Gas Department. In the two photographs reproduced above can be seen the modern entrance vestibule as it was before conversion and as it is now. The important thing is that the transformation has been achieved by such inexpensive means as covering the walls and ceiling joints with veneered composition boards and decorative moulding. Costly structural alterations were purposely avoided. The Chief Engineer's Department was responsible for the design.

Price Revisions

In our Annual Review last week the East Midlands Gas Board was credited with being believed to be the only board which did not, during 1950, make any increase in the price of gas directly related to the increases in freight charges and other costs announced last May. It was added that having revised its prices in 1949 the Board decided for the time being to absorb a sum budgeted for reserve but gave warning that this would leave no margin for any further rises in costs, which would necessitate immediate review.

We have since been reminded that identical circumstances prevailed in the North Eastern Gas Board. We recall that in a statement to the North Eastern Gas Consultative Council in August Dr. R. S. Edwards, Chairman of the Board, said 'the Board feels that no increase in the price of gas should take place at the present time, but the Council should be warned that there will remain no margin capable of absorbing any further substantial rise in costs.'

Calendars and Diaries

We warmly appreciate the seasonable greetings which have accompanied the following tokens, and take the earliest opportunity in the New Year of reciprocating the kind wishes expressed:—

Albright & Wilson, Ltd., calendar; British Vacuum Cleaner and Engineering Co., Ltd., wall calendar and pocket diary; Darien Press, Ltd., Edinburgh, wall calendar; R. and J. Dempster, Ltd., set of 1951 date cards for desk calendar; Drakes, Ltd., Halifax, refill for pocket diary; Fords Advertising, Ltd., Bristol, wall calendar; London Co-operative Society, wall calendar; R. and A. Main, Ltd., diary; Mavor & Coulson, Ltd., wall calendar; Standard Furnace and Setting Co., Ltd., business man's pocket diary; Stewarts & Lloyds, Ltd., desk calendar; Straker Brothers, Ltd., calendar and diary; Richard Sutcliffe, Ltd., Wakefield, calendar.

PIPELINE ACROSS THE HUDSON

IN the following extract from the American *Gas Age* of December 7 is described one of the most difficult engineering feats in the construction of the 1,840-mile natural gas pipeline from Texas to New York—namely, the crossing of the Hudson River with 4,680 ft. of 26 in. pipe, which was completed on November 2.

The operation, measuring 4,680 ft. from the valving station at Edgewater, N.J., to the metering pier at 134th Street, Manhattan, is the longest river crossing in the entire system of Transcontinental Gas Pipe Line Corp., comparing with the 4,000 ft. crossing of the Mississippi.

New York, Brooklyn, Long Island, and Westchester utilities took delivery of their first natural gas at the metering station in early December.

Pipe specifications for the pipe used in this crossing are 26 in. outside diameter; 1⅛ in. wall thickness (comparing with wall thickness of 0.325 in. and outside diameter of 30 in. for the system's normal cross-country pipe). Heavy enough (391 lb. per lineal ft., including protective coverings) to resist underwater buoyancy of the gas and eliminate need for weighted river clamps. Pipe has been stress relieved and X-rayed by the manufacturer, Taylor Forge & Pipe Works in Chicago.

The 30 ft. pipe lengths were joined together in 300 ft. sections; each joining consists of five passes by automatic welding machine (submerged arc process). The fourteen 300 ft. sections were welded together manually—30 welding passes. Each weld in the entire river line is X-rayed for faults. The pipe is coated with an average thickness of ⅛ in. of 'Somastic.'

Preparations for the Hudson River crossing had been under way since the spring. Original plans of the contractor which called for laying the pipe beneath the river bed by a high-pressure jetting process were changed when further exploration of the bottom revealed compacted silt which resisted the effect of the jets. Subsequently, a deep trench was dredged across the river from the Jersey shore to a depth of 25 ft. and a width of 30 to 50 ft.

The crossing technique finally adopted was a modification of the traditional method of welding a complete length of pipe and pulling it across to the opposite shore. Along the Hudson, proximity of the Palisades necessitated the fill-in of an apron of earth of sufficient area to accommodate 300 ft. lengths of pipe. These pipe lengths were floated by barge from the welding yard a half-mile upstream and debarked on dollies mounted on two sets of rails laid side by side on the improvised apron. Reserve sections were rolled on to beams next to the rails when the pipe lengths were welded and moved down the rails into the river, the first section was supported by several barges steadied by a tug. As the flotilla moved out into the river, the pipe passed through a sling mounted on pilings off shore which served to keep the pipe in proper alignment over the trench previously dredged in the river bottom.

In succession, the 300 ft. pipe lengths were welded, X-rayed, and pulled into the river. Four winches exerting a 35-ton line pull were located under the West Side Highway; another winch and pulley arrangement on the New Jersey shore in effect exerted a push.

The New York end of the pipe, bent to conform with the profile of the main river channel, was inserted into a cofferdam alongside the new metering pier. There the last welds were made. Final step was the hook-up of pipe in the river with pipe on the Jersey shore.

Fuel Efficiency in the North West

The North Western Gas Board's stand at the recent Manchester Fuel Efficiency Exhibition was planned to illustrate the part played by the gas industry in coal conservation, production of chemical products from coal, and smoke abatement, and to demonstrate the high efficiency of gas and coke burning appliances in both domestic and industrial applications. A wide range of appliances was supplemented by photographs

More than 200 enquiries were taken on the stand and of these half were for coke grates. The remainder covered applications of gas and coke which ranged from galvanising to pig singeing. One enquiry alone was for a load of approximately 100 mill. cu.ft. of gas per annum.

While enquiries were mainly from consumers in the North Western area there were five from other areas, one from Eire, and one from Holland.

During the exhibition Dr. F. J. Eaton, of the North Thames Board, read a paper on 'Recent Improvements in the Efficiency of Domestic Coke Appliances'

in the next issue of GAS SERVICE . . .

will be found . . .

in addition to regular features and serial articles, news and views and personal paragraphs

Serving as a weather vane for the gas industry, the meetings of the gas consultative councils continue to indicate which way the wind of consumer opinion is blowing. Reports of these meetings have more significance collectively than individually, since trends of opinion may be more readily noted. For this reason, *Gas Service* publishes, every two months, a digest of such meetings.

* * *

The exclusive series of articles on publicity and display units throughout the country will continue in the January issue with the story of the year-old studio at Torquay, which is providing the Southern division of the South Western Gas Board with publicity material of a very high standard.

Reviews will cover a wide range of subjects. Such recent exhibitions as the Smithfield Show and the Poultry Show will receive comment, and the new additions to the Gas Council's film library will come in for their share of brickbats and bouquets. Publications of interest to the industry will be noted, and reference made to the growing family of 'house organs.'

* * *

Gas Service is, of course, recognised as the *vade mecum* of sales, distribution, and fitting staffs, and for this reason its pages mirror the activities of the various gas salesmen's circles. Many of these will be reported in the next issue, and particular reference made to the inaugural meetings of two new groups—the Southern Divisional Circle of the South Western Board, and the Cambridge Divisional Circle of the Eastern Board.

* * *

Editorial comment will discuss the peculiar development of the electricity industry and its obvious inability to supply the needs of the domestic appliances it continues to sell. The issue will be completed by the usual technical articles and other features

This number will reach subscribers early in January

Published from the Offices of the *Gas Journal*, price 9d.

TRADE NEWS

Addressing a recent Press conference, Mr. J. H. Lawrence, Managing Director of **Jenolite, Ltd.,** referred to the 'amazing progress this company has made in five short years. We have,' he said, 'broken into the metal pre-treatment field with an unknown material and process to such an extent that 'genolizing' is today known all over the world.'

The firm, continued Mr. Lawrence, had extended its export trade to very nearly every part of the globe, and news had only reached them a few days earlier that one of the largest American building construction schemes, the Metropolitan Housing Unit of San Francisco, had specified the use of 'Jenolite' for the treatment of all steel structures and fittings. In Scandinavia, particularly in Denmark, industries like the bicycle manufacturers, gas companies, the Army, etc., have adopted the 'Jenolizing' process; and on the home front the process has just been approved by yet another department of the War Office. Many reconditioning depôts are now making thousands of light and heavy service vehicles once again fit for use by the 'Jenolizing' process.

'We also continually widen the range of our products and services,' went on Mr. Lawrence. 'This year we have added an aluminium degreaser and cleaner to our stocklist. Similarly, our new decarbonising solution is proving a great boon to the motor repair industry.

Readers of the *Journal* will recall our mention of this process in the issue of October 19, 1949 (p. 170), when we noted its application to a gasholder at Matlock, which had been seriously affected by limestone deposit and rust.

Included among the exhibits to be shown in the West Indies in an export trade mission to the Caribbean organised jointly by the **West Indies Buyers' Guide** and A. S. Jenkinson are the B.500 gas cooker and 'Duette' hotplate made by Sidney Flavel & Co., Ltd.

Ideal Boilers & Radiators, Ltd., will introduce to the trade this month two new boilers—the No. 0-DB 'Ideal' domestic boiler for hot water supply and the No. 1A Series 'Neo-classic' boiler for central heating and hot water supply. The No. 0-DB boiler embodies several improvements over its predecessor, the No. 0-DA. The doors have been redesigned and there is now no projecting ashtray. Any ash or small fuel passing through the hob bar falls directly into the larger and more effective ashpan. This boiler, the smallest in the range, is attractive in appearance and eminently suitable for installation in the smaller type of house. The new addition to the range of 'Neo-classic' boilers embodies a number of features, including a smoke-hood of entirely new design. The smoke-hood is of a universal type so that the connection for vertical or horizontal smoke outlet can be very quickly made. The doors have been re-designed.

'The Symbol of Power in Industry' is the striking title of a new leaflet illustrating various types of industrial electric motors by **Lancashire Dynamo & Crypto, Ltd.,** of Trafford Park, Manchester. These include geared motor units for drives down to as little as 9 r.p.m.; machine tool drives where reliable and continuous maximum production is required; fractional h.p. motors for a wide variety of uses; 'Fankuld' motors for use in fume- or dust-laden atmospheres; 'Corcooled' motors suitable for operating in gritty or moisture-laden atmospheres—in short, an L.D.C. motor for almost any job.

From the **Association of British Chemical Manufacturers** we have received a copy of the proceedings of the Third Chemical Works Safety Conference held at the Royal Hotel, Scarborough, from September 29 to October 1, 1950. Two previous conferences of this nature have been held by this Association, one in 1948 at Harrogate and one in 1949 at Scarborough, both of which aroused considerable interest among safety people. The number of delegates attending the 1950 conference exceeded those of either of the two previous conferences, and once again the papers were by recognised experts in their various fields. The consequent discussions brought out a number of very interesting technical points. Copies of the proceedings are obtainable from the Association (Intelligence Officer), 166, Piccadilly, W.1, at the price of 5s.

Published for the Federation of British Industries by Kelly's Directories, Ltd., and Iliffe & Sons, Ltd., the edition for 1950/51 of the **F.B.I. Register of British Manufacturers** has just made its appearance. The only authorised directory of this important association, it provides a substantial cross-section of producers of British goods in a very wide range, it being a requirement that only goods of members' own manufacture are included. Comprising seven sections, the volume runs to more than 850 pages, dealing with products and services, advertisements, addresses, trade associations, brands and trade names, trade marks, with an addendum covering the products and addresses of new members elected after the main sections went to press. For quick and easy reference the book has reinforced guide tabs to the main sections, and instructions and cross-references are in English, French and Spanish. Substantially bound in full cloth, the volume is priced at 42s., post free, from Dorset House, Stamford Street, London, S.E.1.

Mechanisation as an Aid to
Integrated Accounting Control

This article explores in broad outline the various ways in which mechanisation may be utilised without unduly disturbing the general lines of accountancy organisation already in use within the gas boards.

THE era in which the preparation of the revenue account and balance sheet was considered the one and only function of mechanisation has passed, and the modern conception demands that the same detail must be rapidly presented in many alternative ways for the purpose of management control.

In each separate unit of a gas board there are many diverse commercial and technical functions, and where in a small concern direct supervision is often possible, larger units must necessarily place greater reliance on accounting services to furnish them with information essential for the adequate direction of policy and the elimination of various forms of wasted effort. Delegation of responsibility makes it essential that there be some basis on which attainments and accomplishments can be assessed and compared, and this is where the use of punched-cards can be valuable, for their flexibility of mechanical sorting and tabulation at high speeds enables the accounting function to be provided for, and the same punched cards may be also used for rapidly presenting the information in many different ways for these purposes of management control.

The way in which a punched-card installation should be primarily used may be illustrated by a simple analogy. Let us suppose that we have a ciné-camera and take this on a roving commission round various units of a gas board, taking photographs of different operations and processes. When we screened the film we should see many types of activity and events being projected, such as retorts being charged, mains being laid and repaired, coke being loaded on wagons, stores being handled, on all of which labour, materials, and services are utilised and expended. We should obtain a visual record of events at the particular moment at which we took the photographs, but we could obtain no idea of the cumulative amount or cost of the labour, materials, and services which have been expended on a particular process, or job, for a given period of time.

With a punched-card installation, by means of a system of code numbers for expenses, a definite symbol is allocated to all functions which are similar in nature, independent of the time and place where they occur, and by using labour analyses, and the appropriate basic documents for other types of expenses and receipts, it is possible to record in a permanent form on punched-cards the facts relating to every item of expenditure and receipt. By means of mechanical sorting and tabulating we can rapidly present this information in many alternative forms for use by executives, particularly when it is necessary to 'spotlight' any process or job cost on which it is desired to focus particular attention. The advantages of being able to obtain this information mechanically and thus being able to relieve the staff of small district offices of this additional work cannot be over estimated.

By
T. A. CRABTREE,
F.A.C.C.A., A.C.I.S.

To examine more closely the main applications on which punched-card mechanisation may be used, a hypothetical gas board may be taken to have a four stage organisation comprising (a) 72 units, (b) 12 group organisations, (c) four divisional organisations, and (d) one board headquarters. It is assumed that each group organisation is responsible for six units, each of which may or may not make gas, but all are concerned with distribution. The next stage of the organisation is the divisional level, each of which is responsible for the co-ordination of three groups, and finally the board headquarters which is responsible for the co-ordination of the work of the four divisional offices.

An important point in mechanisation is the relative size of the 72 individual units, and for this purpose the following symbols have been used:—

A = Very small

B = Small

C = Medium

D = Large

and it is assumed that the volume of clerical work in those units indicated by 'D' is sufficient to warrant the internal mechanisation of the unit itself, and that in the cases of those marked 'A,' 'B' and 'C' existing manual methods will still be maintained, as internal mechanisation of these district units would probably be uneconomic.

The accounting and statistical clerical work which has to be done at each unit falls broadly into the classes shown in Table 1.

The work of allocating to expenditure or revenue headings is common to all the elements of cost and revenue, and the summaries prepared by each unit showing the total to be charged or credited to each expense code number will be now referred to as abstracts. There will thus be 11 standardised weekly abstracts for each unit, although in practice the actual number of documents may be reduced.

TABLE 1

ACCOUNTING WORK AT UNIT LEVEL

Source	Specific application
Expenditure (allocations to cost headings)	
1. Labour	Payroll preparation
2. Materials	Stores control and ledgers
3. Services and outside purchases	Payments schedules
4. Petty cash	Payments schedules
5. Tansport	Tabulation of vehicle running costs
Costing of rechargeable work	Costing
Capital projects	Costing
Revenue (allocation to revenue headings)	
6. Quarterly gas credit consumers	Preparation of consumers' bills and control of debtors
7. Prepayment gas consumers	Collection schedules
8. . imple-hire rents	Preparation of bills and control of debtors
9. Hire-purchase instalments	Preparation of bills and control of debtors
10 Rechargeable work	Preparation of bills and control of debtors
11. Sundry revenue	Preparation of bills and control of debtors

Mechanisation at Unit Level

In the case of 'D' units one punched-card installation can be designed to cover all the normal accounting work in the unit such as pay-roll preparation, stores control, payments schedules, costing, preparation of consumers' bills and various statistics. Further the installation can be designed mechanically to tabulate all the 11 'Weekly Unit Abstracts' which would be passed to group level in much the same way that manually prepared abstracts are submitted by those units which are not large enough to justify individual mechanisation.

Where a unit is mechanised the local accountant is in exactly the same position as regards information as before, except that he is relieved of a large volume of clerical summarisation work. All the tabulated weekly abstracts are still produced at unit level, and passed to group level, and it is not necessary in these circumstances for any primary documents to leave the unit.

There are many alternatives available in designing a unit scheme of mechanisation and each can be designed to meet local peculiarities. Without making a thorough survey of all the clerical work involved as a unit, it is not possible to say at what size of unit mechanisation would be economic, but it is important to remember that a punched-card installation can be designed to deal with all the specific applications within the unit and is not confined to one only.

At group level we are not concerned with all the detail found at unit level, but with the summarisation of the abstracts prepared by each unit, which when aggregated produce the 'group revenue account.'

Group Level

In our hypothetical gas board each group level controls six units and as each unit produces 11 abstracts, which are prepared manually in the case of small units, or mechanically in the case of large units, there is the task of summarising these 66 abstracts to produce the 'composite group revenue and expenditure account' with the equivalent ones for each individual unit.

Cards would be punched at this stage for the proportion of overhead charges which are passed to the group by each division, and also for any inter-district transfers and adjustments, which would be included in all subsequent tabulations.

Several copies of the group and unit revenue and expenditure accounts may be produced by one tabulation of the cards, and copies may be sent to each unit accountant if desired, so that the latter is kept fully informed as regards his own unit only.

Further an installation at group level can be designed to post all the capital accounts for each unit, and all the tabulations may be balanced to control totals to prove their accuracy. Alternatively one set of equipment may be installed at group level but not identified with a particular group, which would act at a functional service to all groups in the board, and would tabulate the 12 group revenue accounts as well as those relating to the 72 individual units.

Divisional Level

The work at divisional level consists of summarising the three group revenue accounts for the purpose of producing the divisional revenue account, and it is unlikely that this work alone would justify an installation at each of the four divisions.

An alternative would be to by-pass completely the summarisation at group level in which circumstances each of the 18 units comprised in a division would send in their 11 individual weekly abstracts direct to the divisional level where cards would be punched and tabulated, to produce

(a) Unit revenue accounts (copies being sent to units and groups).

(b) Group revenue accounts (copies being sent to groups).

(c) Divisional revenue account.

All summarisation would be done at divisional level but the individual groups and units are in no worse position than they were, as they would have tabulated copies of all the revenue accounts in which they are interested.

An added advantage is that where the board wishes to investigate any process or job cost, the whole of the punched cards are available at divisional level and may be speedily tabulated for further detailed information on a geographical basis. The posting of the capital accounts may also be dealt with on the four divisional installations and where budgetary control is in operation, the tabulator can be designed to compare, and mechanically print, the variance of the actual expenditure from the budget or pre-estimated amount.

Board Level

At board level there are the four divisional revenue accounts to be summarised to produce the board revenue account, and as an alternative to having a separate installation at board level, for this work alone, the summarisation may be accommodated on a divisional installation if desired.

Mechanisation of specific applications implies the centralisation on a punched card installation of one or more of the following main applications:—

(a) Payroll preparation.
(b) Stores control.
(c) Payment schedules and creditors control.
(d) Preparation of consumers' bills (including gas charges, meter rents, simple-hire instalments, hire-purchase instalments, rechargeable work, fittings and residual sales).
(e) Control of debtors.

(a) Payroll preparation. It will probably be impracticable to mechanise this application at any higher than group level, and each case would have to be examined on its own merits, with particular reference to any geographical difficulties. In any event it is essential that each unit must have the fullest information of make-up for the purpose of settling wages queries on the spot, and if the payroll is prepared at group level, copies of the detailed payroll showing gross pay, tax, and deductions, can be supplied to each unit with the relative payslips.

(b) Stores control.—The volume of stores movements and the number of stores items is a factor of great importance and mechanisation at group or divisional level would normally be justified.

Tabulations can be designed to extend mechanically the deficiencies and surpluses against authorised quantities on each stock line, for the information of the purchasing officer, who is thus able to conserve capital resources by arranging transfers of surplus stocks between the various units. Again special tabulations of unmoved stocks can be prepared when required and a pre-requisite of such a system is the existence or initiation of a common stores commodity code covering all stores items.

The stores balance tabulations may also be used for calculating new average prices for the evaluation of future stores issues, or alternatively the system may be designed to provide for the pricing of requisitions on the 'first-in—first-out' method.

(c) Payment schedules and creditors control.—This is another specific application which can usefully be centralised at division or board level and can be accommodated on an installation at either of these two levels. The main advantages which accrue are the elimination of creditors' control for each group, as well as some economy in stationery and postage costs.

(d) Preparation of consumers' bills and revenue statistics.—The centralised production of quarterly consumers' gas bills is another example of the mechanisation of a specific application; and as normally the cost of producing the bills decreases in ratio to the number dealt with, this condition is best satisfied by mechanisation at as high a level in the organisation as possible. It is essential, however, to make certain in designing the system that the unit manager who has to maintain the close relationship with the individual consumers shall not be placed at any disadvantage in this respect.

(e) Control of debtors.—Although normally there is a strong case for the mechanisation of consumers' bills at as high a level in the organisation as is possible, the control of sundry debtors must usually be maintained at unit level. The close relationship between the consumers and the unit manager is essential at all times, and it may often be found impracticable to transfer this function to a higher level, particularly where the typical board is covering a widely dispersed geographical area.

Punched-card systems for the 'control of sundry debtors' can be designed to place the unit manager in no worse position in this respect and to provide him with information, available in his office, to answer immediately any local enquiry as to how much a particular consumer has outstanding at any time.

At the same time provision can be made for mechanised control accounts from which tabulations, divisional or group offices can ascertain at any time the total amount outstanding for any unit manager's territory, the responsibility for the detailed collections still remaining among the unit manager's responsibilities.

Paper Shortage Threat

Serious consequences of a paper shortage, affecting both the home and export trade, are foreshadowed in a letter sent by the President of the Board of Trade to all local authorities, in support of the new salvage drive which is being launched by the Waste Paper Recovery Association.

Appealing for nation-wide co-operation, Mr. Wilson says: The consumption of waste paper by mills has substantially outstripped collections and stocks of waste paper in the hands of the mills have fallen to a dangerously low level. Unless collections can be increased, home production of many kinds of paper and packaging boards is bound to fall at a time when supplies are already inadequate to meet the ever-growing demand.

Commenting on the letter, Mr. S. T. Garland, General Manager of the Waste Paper Recovery Association, said that practically every industry in the country is dependent on waste paper and board in some form or other, and the growing shortage constitutes a grave threat to trade. It is estimated that 1 mill. tons may be needed during 1951 to fulfill the packaging needs of defence, the export trade, and the home market. At least 600,000 tons of this must be recovered from industry. Shops, business houses and factories must safeguard their own future supplies of paper and packaging by allowing no used paper to be destroyed, and by giving over all they can collect to the mills for re-pulping.

DOMESTIC VERSUS INDUSTRIAL COST PER THERM*

By H. BROMLEY, M.Inst.Gas E., M.Inst.F.,

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THE question of rate or tariff for specific consumer loads has always raised strong arguments for and against maximum or minimum price per therm; some undertakings have gone so far as to take the cost of gas into holder (plus a small proportion of the distribution costs) as a minimum charge per therm. In most cases, these undertakings have built up a good industrial sales load which has increased steadily year by year, with the exception of trade slump periods (and incidentally, during these periods all loads are affected). This applies to most industrial areas. In non-industrial areas, however, the difficulty appears to have been that undertakings were afraid to create a precedent because a concession to one section of consumers—which of necessity must be small in actual numbers—might cause other sections to expect similar concessions. In seaside towns, for example, the commercial or catering section would expect treatment similar to that accorded to industrial users, despite the differing conditions of load. However, the Gas Act, 1948 (part IV, section 53, sub-section 7) requires that each section of consumer load should carry its own cost in principle without subsidy from other loads—*i.e.*, no undue preference shall be shown to any class of consumer.

Many in our industry realise from experience the vast difference in the problems of serving and supplying an industrial area compared with those of a non-industrial area. Between the two extremes come the seaside towns with their catering and commercial loads, involving seasonal peaks for which provision must be made.

Having had experience of heavy industrial areas, and now being engaged in an area where the domestic and catering loads predominate, it is impossible to ignore the complete difference there is between the distribution system planned for an industrial area, where the load of one factory may be equivalent in therms per annum to that of a medium sized market town, and that planned for a purely domestic area.

Since coming to the south of England, I have found myself comparing the initial capital cost and annual expenditure incurred by an undertaking, and its effect on the cost of gas per therm to the consumer in supplying gas for differing types of load from, say, the purely domestic to the wholly industrial—especially as the whole of the cost of an industrial supply can be charged to the consumer.

Let us consider the comparison between the load of a housing estate of 1,200 houses and shops (sometimes called a 'neighbourhood unit') and an equivalent industrial load, each being at approximately the same distance from the existing distribution system — *i.e.*, the feeder mains are of similar lengths.

The normal practice for assessing the value of new domestic loads is to take the cost of the feeder main and estate mains required, and compare this against the probable revenue from the consumption. As a basis for calculation, allow 130 therms per consumer per annum (C.V.475) and assume a profit of 1½d. per therm. Set the estimated annual revenue against the capital cost incurred by the undertaking, and provided the resultant percentage return on the capital outlay is in the region of 6%, the charges to be set against the load will normally be covered. In the initial stage no charges are set against the load for services, meters or carcassing, &c., or for annual maintenance.

For the industrial load, consideration has been given to the quantity of gas used at a sheet metal stamping works (see Appendix II). This is approximately the same consumption per annum as is expected from the domestic load of the housing estate (see Appendix I). I have also taken for comparison two central heating loads at local schools, which are definitely seasonal loads, and another housing estate with a consumption per annum comparable to these loads.

FIRST COMPARISON

Domestic

A housing estate in Bournemouth of 1,200 consumers (now in the process of construction). Allow 130 therms per consumer per annum (C.V. 475) giving 430 therms per day or 156,000 therms per annum.

Being a domestic load, the actual consumption requirements will vary from, say, 10 to 130 therms per hour according to time and also seasonal demands, &c., with the main peak occurring principally at lunch-time. In order, therefore, to meet this type of load the feeder main and the governors must be capable of supplying these peaks, and provision must be made to meet any increase in consumption due to development on both the estate and the adjoining area. This development will be mostly domestic and will accentuate the peaks. Thus the size and cost of the feeder main, &c., must be greater than that required initially for the estate, and will proportionally reduce the return of revenue on the capital expenditure. This applies in principle to both domestic and industrial loads, but the peak load is usually small with an industrial load and often at a different time from that of a domestic load; therefore the size of main for an industrial load can be smaller than that required for a housing estate.

To supply the domestic load of 1,200 houses, the following are required:

1. Feeder main 400 yd. of 8-in. and terminal governors suitably housed.
2. Estate mains of adequate size to allow for normal low pressure distribution of gas from district governors with single mains system. (Duplicate mains would, of course, increase initial capital expenditure.) Approximately 3 miles of 4-in., 2 miles of 6-in., and ¼ mile of 8-in. required.
3. Service laid to each consumer approximately 50 ft.
4. Meter supplied and fixed to each consumer.
5. Each house carcassed for minimum of four points.
6. Appliances and installation to each consumer; *minimum* one cooker and one copper. Many have fires and water heaters in addition.
7. Provision at local showrooms and depot for extra calls on staff and transport.
8. Allowance for increase in accounting and clerical duties at office.

Costs for Domestic Loads

Feeder mains	1. Actual		£1,000*
Estate mains	2. Actual cost to date		8,200
	Estimated to complete ...		1,500
	Gross total		£9,700*
Services...	3. Actual cost to date		£1,600
	Estimated to complete ...		2,800
	Gross total		4,400
	Less contribution for length over 30 ft. at 1s. 6d. per ft. ...		1,800
	Net total		£2,600*

* Paper to London and Southern Section of the Institution of Gas Engineers, December 5, 1950.

Meters	4. Actual cost to date	£3,020
	Estimated to complete ...	4,780
	Gross total	£7,800
	Revenue from rentals over 12 years	£3,800
Carcassing	5. Actual cost to date	1,800
	Estimated to complete ...	2,700
	Gross total	4,500
	Less contribution at £2 per house (four points)	2,400
	Net total	£2,100*
Applicances and installation...	6. Actual cost to date	£12,500
	Estimated total cost	30,000
Staff, transport, showrooms, accounts, etc.	7 and 8. Estimated net total ...	£1,000*
	Gross total	£58,400
	Net total	£24,200

* Items incurred by the undertaking.

Thus, from the total initial capital cost of £58,400, the net cost to the undertaking is £24,200, which must be set against the revenue from the load. Items 1 and 2 may qualify for a contribution from the estate developers, but I would suggest that this would be a maximum of one-third; in this instance no contribution was received. With item 3, a contribution is called for and was received for all lengths over 30 ft. With item 4, a meter rent of 5s. per annum is charged, depending on the size of the meter (normal domestic D.1). Therefore, over a period of 12 years the sum of £3,800 would be repaid, but by this time replacement of meters may be called for. With item 5, a contribution of £2 per house carcassed for four points is called for and was received. Number 6 should be self-supporting in any case, despite initial capital expenditure—*i.e.*, over a period, or by lump sum. A lump sum has been and will be received. Numbers 7 and 8 must be debited against revenue.

The net capital cost of £24,200 as shown must be set against possible revenue, which is naturally small to start with but increases as the estate develops.

Industrial Load—A Metal Stamping Works Already in Operation

The position and load is comparable with the domestic example With the load as previously mentioned, the capacity of the feeder main and governors is used more to advantage because the superimposed peak load, due to the canteen, is small in comparison with the main load; thus allowance for future load can be made without the cost being disproportionate.

Estimated consumption per annum from domestic consumers	=	156,000 therms
Therefore, taking the figure of 156,000 for industrial purposes over 300 days (Actual consumption see Appendix II.)	=	520 therms per day
1. Therefore, over say, 20 hours	=	26 ,, ,, ,,
2. ,, ,, ,, 10 ,,	=	52 ,, ,, ,,
3. ,, ,, ,, 8 ,,	=	65 ,, ,, ,,

To supply the industrial load the following were required:

1. Feeder mains and governors; two 4-in. size and one 2-in. size.
2. *Meters.* Three 6,000 cu.ft. per hour and two 3,000 cu.ft. per hour are installed, suitably housed with the governors (houses provided by consumer).
3. Internal supplies (mains and services).
4. Apparatus and installations (see Appendix).
5. Initial technical supervision.

Costs for Industrial Load:

Feeder mains ..	1. Actual cost	£1,150
Meters	2. Actual cost	£780*
	Revenue from rentals over 12 years	£216
Mains	3. Actual cost	£1,800
Apparatus ..	4. Actual cost	£20,000
Technical.. ..	5. Estimated cost	£500*
	Total	£24,230
* Items incurred by the undertaking, total		£1,280

Making a total capital cost of £24,230, of which the net cost to the undertaking is £1,280.

As before, depending on policy, items 1 and 2 would receive a contribution; items 3 and 4 would be paid for. In this instance all were paid for except the initial cost of the meters (rentals £18 per annum) and technical advice. Gas consumption was maximum immediately with the industrial load, in direct contrast with the domestic load which will take many months to reach its maximum.

Summary of Total Capital Expenditure

	Domestic		Industrial
1	£1,000	1	£1,150
2	9,700	2	780
3	4,400	3	1,800
4	7,800	4	20,000
5	4,500	5	500
6	30,000		
7	1,000		
	£58,400		£24,230

Summary of Net Charge Against the Undertaking

1	£1,000	1	Nil
2	9,700	2	£780
3	2,600	3	Nil
4	7,800	4	Nil
5	2,100	5	500
6	Nil		
7	1,000		
	£24,200		£1,280

As mentioned previously, assuming a profit of 1½d. per therm (C.V. 475) on each type of load—

$$\text{Maximum revenue} = \frac{\text{Annual consumption in therms} \times \text{profit} \times 100}{\text{Capital expenditure}}$$

$$\text{Therefore domestic revenue} = \frac{156{,}000 \times 1.5 \times 100}{24{,}200 \times 240} = 4\%$$

$$\text{Industrial revenue} = \frac{156{,}000 \times 1.5 \times 100}{1{,}280 \times 240} = 76.1\%$$

(But as this industrial consumer is under contract, the revenue is actually 55.6%.)

This calculation shows that on initial capital expenditure alone industrial gas at the same cost per therm as domestic gas subsidises domestic supplies, and if the profit margin should be the same for all loads it justifies a major reduction in price to the industrial consumer.

The above calculations do not take into account the comparison of the annual costs which can be itemised as follows:

Annual Costs

Domestic	*Industrial*
1. Boosting costs, proportion of.	1. Boosting costs, proportion of.
2. Feeder and governor maintenance.	2. Feeder and governor maintenance.
3. Local district maintenance.	3. Meter maintenance.
4. Meter maintenance.	4. General maintenance (chargeable).
5. Appliance maintenance.	5. Technical advice.
6. Showrooms and depot, proportion of.	
7. District inspector, proportion of duties.	
8. Showroom attendants, proportion of duties.	
9. Stores general clerk, proportion of duties.	
10. District personnel, proportion of duties.	
11. Fitters, &c., proportion of duties.	
12. Meter collector, proportion of duties.	
13. Accounts and records, proportion of duties.	

It is obvious, although no figures have been quoted, that the annual costs to be debited against the two types of load are far from equal, as on the industrial side costs must be far below those of the domestic, because with the *industrial load* not only is the intitial capital cost low, but distribution costs are low; clerical

and accountancy costs are small; production costs are less due to constant and steady known load with no adverse peaks; booster costs are lower due to the steady rate of pumping over known fixed periods; holder storage can be minimum due to steady demand; and standby plant can be reduced because load is not seasonable.

Three further examples in support of the general argument follow—two central and hot water heating, and one domestic.

School I

For 550 pupils, 14 classrooms, two domestic science rooms, handicrafts, canteen, &c., the installation consists of:

1. Two 6.R.9. 'Ideal' boilers with 'Duoflam' burners, each having a capacity of 1,456,000 B.Th.U. per hour with a 25% margin. Each covers two-thirds of load; therefore both boilers are required during severe cold spells only.
2. Domestic hot water boiler by Beeston, eight section R.S.2, capacity 588,000 B.Th.U. per hour, also with 'Duoflam' burners supplying a 500-gal. cylinder.
3. Annual consumption, 34,000 therms (domestic and heating). Maximum hourly consumption, 40 therms. Normal hourly consumption, 17 therms.
4. *Capital Expenditure:*

(*a*) Main, &c., 225 yd. 4-in.	£250
(*b*) Meters, two 6,000 cu.ft. per hour, one 1,800 cu.ft. per hour	300*
(*c*) Installation by contractor	13,000
(*d*) Installation (internal)	90
(*e*) Technical advice	100*
Maximum capital expenditure	£13,740
* Cost to undertaking	£400

Therefore:

$$\text{Revenue} = \frac{\text{Annual consumption in therms} \times \text{profit} \times 100}{\text{Capital expenditure.}}$$

$$\text{Revenue} = \frac{34{,}000 \times 1.5 \times 100}{400 \times 240} = 53.1\%$$

(With gas at ordinary rate less 17½% discount on scale, the revenue = 43.8%.)

School II

Eight hundred pupils, 22 classrooms, two domestic science rooms, handicrafts, &c.

Installation:

1. Three C.3 'Vesta' boilers, capacity 1,200,000 B.Th.U. each with 25% margin of load.
2. Hot water, two 'Equator' and two 'Ironclad' boilers.
3. Annual consumption, 15,000 therms (domestic and heating). Maximum hourly consumption, 37 therms. Normal hourly consumption, 11 therms.
4. *Capital Expenditure:*

(*a*) Main and service, 620 yd.	£500*
(*b*) Meter, 6,000 cu.ft. per hour	100*
(*c*) Internal supplies	200
(*d*) Installation of boilers, &c., by contractors	10,000
Capital expenditure	£10,800
* Cost to undertaking	£600

Therefore:

$$\text{Revenue} = \frac{15{,}000 \times 1.5 \times 100}{600 \times 240} = 15.6\%$$

(In this case a pre-war contract exists and percentage is 8.5%.)

For the first school, therefore, a major reduction in price per therm would appear to be justified, despite the fact that the major load is seasonal. In the second instance, again despite the fact that a special discount has been given, the load is still economic.

Housing Estate, Poole

Five hundred houses when completed. Actual number to date 350.

Appliances installed, 350 cookers and 350 boilers.

Cost of Mains, &c., to Board:

(*a*) 5,285 yd. 4-in., 6-in., and 8-in.	£3,990
(*b*) Services at £2 5s. per house	1,125
(*c*) Meters at £6 10s. per house	3,250
(*d*) Carcass at £2 per house	1,000
(*e*) Fix cookers at 15s. per house	375
	£9,740

Taken on the same basis as before:
130 therms per consumer per annum = 65,000 therms.
Therefore

$$\text{Revenue} = \frac{65{,}000 \times 1.5 \times 100}{9{,}740 \times 240} = 4.2\%$$

The result is very similar to the housing estate previously mentioned.

In an estate of 43 houses, which has an annual consumption per consumer well above the figure of 130 therms quoted, adding the approximate initial capital cost of 43 services, meters and carcasses, &c., borne by the undertaking, the revenue becomes :

1. Mains (actual cost)	£262
2. Services (actual cost)	80
3. Meters (actual cost)	230
4. Carcassing (actual cost)	60
5. Fix cookers (actual cost)	18
	£650

$$\text{Revenue} = \frac{7{,}615 \times 1.5 \times 100}{650 \times 240} = 7.3\%$$

Industrial loads.—Due to circumstances beyond the undertaking's control, such as changes in manufacturing processes, load may be lost; alternatively, load may, and generally does, increase.

Domestic loads.—Load may be lost but not usually in bulk. Concessions are not demanded as by one body, as is the case with the industrial consumer.

It is not possible for all undertakings to have large industrial loads on their doorsteps. As an example, the Bournemouth area is primarily non-industrial, the approximate loads being as follows:

Domestic	68%
Commercial	22%
Industrial	6.5%
Public lighting	3.5%

I am convinced that it is a paying proposition for every undertaking to go all out for industrial and heating loads, as both are capable of easy and rapid expansion, provided that the cost per therm charged is reasonable and competitive with other fuels.

APPENDIX I

Housing Estate, Bournemouth. *Main basis of paper.*

One thousand two hundred houses and shops on completion. Actual number to date 500.

Appliances installed :

Cookers	497
Boilers	498
Sink heaters	100
Gas lighting	40
All electric houses	2

APPENDIX II

Industrial Load. *Metal stamping works. Main basis of paper.*

Maximum annual consumption, 190,000 therms.
Maximum possible hourly consumption, 114 therms.
Normal hourly consumption, 40 therms.
Apparatus: Enamelling stove, salt baths, drying ovens, printers ovens, hot tanks, Briggs steam boiler, Ideal boiler, sink heaters.
Full canteen equipment, plus sundry overhead heaters, soldering stoves, blow pipes, boilers, ovens, cookers, fires and radiator

DISCUSSION

Mr. **J. C. Hogg** observed that the author had made a study of certain picked circumstances and had underlined them clearly. Mr. Bromley's previous experience in the north-west had been with undertakings whose industrial loads amounted to 50% of the total output, and it was of great interest to compare the results of an undertaking with a predominantly domestic load like Bournemouth and one with a high industrial output. The principal factor was the capital cost involved, and it was for this reason that an attractive tariff could be offered to the industrial consumer. Most industrial consumers were hard-headed business men who did not respond in the same way as did domestic consumers to the showroom type of salesmanship. They responded to attractive tariffs and to a picture of increased efficiency of production. They would not hesitate to change from one fuel to another if they saw any advantage from the economic standpoint. There were two types of industrial load factor, went on Mr. Hogg—one fairly static and one which shut down at the week-ends—and it was wise to differentiate clearly between them by reason of their effect on the production side. Gasworks with a 50% industrial output would have some difficulty with loads which closed down from Friday night till Monday morning, though integration would tend to smooth out the effect.

Mr. **S. G. Bishop,** who said he had been connected with the Bournemouth undertaking before Mr. Bromley joined them, observed that they were particularly interested in the distinction between the industrial and domestic loads because they had two large towns in their area which were contiguous—Poole and Bournemouth. The former was a commercial area, while the latter was principally a pleasure resort with a secondary area of housing. Poole was growing appreciably—not with large factories but with small-scale works which would gradually take up a large proportion of their gas.

Mr. **W. Morland Fox** made a plea for attractive tariffs for the large domestic consumer. He himself had wanted to install gas central heating in his own house; but the lowest price his gas undertaking could offer was 1s. 4d. per therm. This put gas right out of court so far as he was concerned, and he installed an anthracite hopper boiler. For his house of five bedrooms, three reception rooms, and the usual offices, with about a dozen radiators, the fuel consumption was under 10 tons per annum, or about 4 cwt. per week. This cost him (on the basis of 60 therms per week) £1 for anthracite as compared with £4 a week for gas. He could not get any price concession for either gas or coke.

Mr. **W. T. Houston** agreed with the first speaker that the industrial consumer was not affected by ordinary publicity; he was simply concerned with economics and the advantages he could get from any fuel. Consequently, a sound tariff must be the basis of any endeavour to gain the industrial load. But this was where he was going to criticise Mr. Bromley's statement that the industrial load was easy of expansion. He entirely disagreed. With the finest possible tariff the load could be lost if the industry had not the right people to tell factory managers what gas could do. There was an amazing ignorance about gas in most factories. In the Wandsworth area they had made a great thing of the domestic central heating and hot water loads and had some 2,000 installations at a price equivalent today to 1s. per therm. They must get some sort of competitive tariff for the big domestic consumer.

Mr. **H. J. Escreet** said that in the North Thames area they took the actual cost of the mains and brought that to an interest charge of 6½%. They divided that (in pence) by the estimated consumption in therms per annum, which gave the charge in pence per therm. They had a limiting figure beyond which they would not normally go. He was rather surprised to note that the cost of mains seemed to average 15s. per yard. This was very low, and he wondered if it included overheads.

Dr. **G. E. Foxwell** commented on the statement that all industrialists were hard-headed business men. He felt it was rather a matter of Jekyll and Hyde, for while they worked out costs to the last decimal point, when it came to using the gas the inefficiency was enormous. He was also a little surprised at the statement that one could reduce the price per therm despite the fact that the major load was seasonal. Was Mr. Bromley neglecting the fact that the seasonal load was very expensive and might well be a reason why one could not reduce the cost? With regard to Mr. Morland Fox's remarks, he emphasised that gas could never compete with solid fuel on basis of cost. They were a two-fuel industry, and they must decide which was the more convenient for the job.

The **Chairman** (Mr. T. C. Battersby) said that Mr. Bromley had certainly attempted to make out a case for special tariffs for industrial consumers. Most of them knew that such tariffs did exist throughout the industry. In the Watford division tariffs to promote industrial sales had been in existence for many years, and at the present time they were negotiating for a very substantial load at a greatly reduced price by reason of the special circumstances—in this instance the consumer had his own gasholder. Indeed, without this holder they would not be able to satisfy his demand at all. This was, of course, a special case; but they must try to get the whole picture—not making a number of individual agreements but devising overall tariffs which were not only promotional but also fitted into the production and distribution system. It would be dangerous to argue the case for industrial tariffs entirely on the comparisons submitted by Mr. Bromley that day. They were rather exceptional and too clear-cut; they rarely met such cases in practice. The undertakings in his division were laying mains in four new towns in each of which there was an industrial area; but it was extremely difficult to forecast the ultimate demand. The industrialist who was contemplating a move into one of these new towns was shielded by his agent. He did not want his employees to know of the proposed move in case they sought other employment—and even when the gas undertaking knew he was going it was difficult to anticipate the load. They might find themselves in the embarrassing position of having a substantial demand at the very extremity of their distribution system. Disparities between the summer and winter load made it exceedingly difficult to forecast the potential consumption of any new area. Fortunately, the industrial load did not coincide with the domestic load. Mr. Bromley had taken 23 cu.ft. per consumer in determining the size of main. The Chairman said they usually worked on 20 cu.ft. on the assumption that 75% of all premises used gas. In a paper to the Wales and Monmouthshire Association of Gas Engineers and Managers in September, 1949, Mr. W. T. Hird took the figure of 30 cu.ft.

The Author's Reply

Mr. **Bromley,** replying to the discussion, said it was a very involved subject to assess the value of an area—whether it was domestic or industrial. He had seen domestic loads grow far beyond the capacity of the mains. This had occurred in Bournemouth and had necessitated boosting. The figure he had usually taken for domestic consumers was round about 20-21 cu.ft. The actual examples he had taken related to Dudley (pre-war) over the peak hour—and the figure was 21 cu.ft. per consumer in an estate of 5,000 properties, including one or two small industrial loads. This gave a balance for future expansion because clearly 21 cu.ft. was on the high side, and anything above that gave ample capacity for future loads. They tried to be frank with domestic consumers about central heating. Gas was three times more expensive than solid fuel; but against that they must weigh all the advantages. He would never recommend the installation of gas central heating without automatic control to the finest limits. He had been in areas where the central heating load was at 5d. per therm. The domestic consumer should get benefits as well. From the manufacturing point of view, he was always brought up to understand that if plant could be worked to full capacity the cost per therm would be cheaper. In Bournemouth the domestic load was far higher than other loads, which left little opportunity for overhauling manufacturing plant. Every undertaking must fix its tariffs in accordance with its particular circumstances. Continuous 24-hour loads should be cheaper because they did not bring any strain on the mains. So far as capital cost of mains were concerned the basis of calculation did not matter very much so long as it fitted into the particular circumstances. He agreed that the efficiency of many industrial appliances was shocking. They must have experts to deal with such matters. The mains costs quoted in the paper were largely pre-war, being the only ones available. The use of an excavator, provided they could keep it constantly employed, made main-laying much cheaper.

Sir **George Evetts** proposed a vote of thanks to Mr. Bromley, remarking that he would never in any circumstances sell gas at less than the figure named in the opening paragraph of the paper. Mr. Bromley had put his finger on the reason why the industrial consumer showed up so well; it was because he carried the major part of the capital cost of the installation. That was an excellent reason why he should be given a lower price than anyone else. Sir George said he would not offer any concessions for central heating only.

Mr. **E. Wulston Atkins,** in seconding the vote of thanks, remarked that the discussion had brought out the fact that while from the distribution engineer's point of view the paper had been admirable in every way, from the purely commercial aspect some of the conclusions might be rather dangerous.

Gas in France

Our Own Correspondent extracts from the French Technical Press a selection of topics concerning current gas developments across the Channel.

OUR French contemporary announces one more step towards the definitive organisation of the nationalised gas and electricity industries. In the original Law of Nationalisation of April, 1946, it was laid down that the management of the production and distribution of gas was to be entrusted to public bodies of an industrial and commercial character to be named 'Gaz de France, service de production et de distribution' followed by a corresponding geographical name. They would correspond to our area boards. A decree (corresponding to our 'Order in Council') promulgated on May 24, 1950, has given effect to the original law on the following points: the delimitations of areas must be approved by order of the Ministry in control of gas; the National Service 'Gaz de France' may take over the direct management of works producing gas; it may entrust the exploitation of the apparatus for the transport of gas to the public bodies (area boards); the charges for the transport of gas are to be the subject of a type-scale. The enquiries implicit in the above with the former controllers, general councils and chambers of commerce, were concluded some weeks ago and it remained to take the necessary decisions. A first decree, published on October 6, fixes at 16 the number of areas for gas and 26 for electricity.

The Decree, published in the November issue, fixes the relations between the 16 'public establishments' of Gaz de France and the communes which they serve. For nearly 30 years relations between gas companies and local governing bodies have been those of 'concessionaire' and 'concedante,' the terms of the agreement being expressed in a 'cahier de charges.' Substantially this arrangement is retained, with the substitution of the 'public establishment,' comparable to our area board, for the gas company. The gas 'board' is given the sole right of supply, with the duty of maintaining it, with consequential rights to lay mains and services, open streets, etc., all this work to be done with the knowledge of the commune or group of communes served and in conformity with certain requirements with regard to the maintenance of roadways. There are rules fixing the liability of the consumer for certain services. The cost of installing and maintaining meters is to be charged to the consumer and rules are laid down for their verification.

The quality of gas supplied is to be defined by pressure and by calorific value, both values to be agreed between the gas 'board' and the commune. The tolerance allowed for the latter is curiously varied according to the volume supplied to the commune. If this is less than 1 mill. metres per annum (say, 35 mill. cu.ft.), the tolerance in the quarterly average is plus or minus 4%, from 1 mill. to 10 mill. cu. metres it is 2%, for more than 10 mill. it is 1%. 'The gas must be perfectly pure. At the same time, it must always possess an odour sufficiently characteristic for leakages to be immediately perceptible by the sense of smell. This odour must disappear with the complete combustion of the gas.' The municipal authority is at liberty to verify these characteristics—'agents appointed by the concessionnaire are invited to follow the tests.' Rules for modification of the 'declared values' are laid down, the concessionnaire to bear the expenses of any consequential alterations and adjustment to appliances in use.

Gas Tariffs

Tariffs are generally to be of the two-part type, a standing charge and a commodity charge, and every consumer may demand to be charged on this basis. At the same time a diminishing block charge is permitted, as well as special systems of charges, but these must be arranged with the agreement of the commune and the concessionnaire subject to the conditions that the same terms must be offered to every consumer under equivalent conditions of supply and use.

An interesting article is that providing for variation of tariffs according to the prevailing economic situation. A 'gas index' G, is determined for each quarter according to the formula G=6 plus 32 C/Co plus 32 S/So plus 30 E/Eo, where C/Co is the ratio between the mean monthly value of the price index of French coals for the current quarter and that for the quarter when the gas index was fixed; S/So is the similar ratio relating to wage rates of mechanics and electricians; E/Eo the similar ratio of price indexes of industrial products, all as ascertained by the appropriate authorities specified in the Decree. The initial value Go is 100 and the tariffs are multiplied by the fraction G/Go. The value of the index is to be declared by the 'Conseil superieur de l'Electricité et du Gaz' and published before the end of the first month of the quarter by the Minister in charge of gas. Under certain conditions the basic tariffs may be modified 'to maintain the receipts obtained by the sale of gas in harmony with the total of the charges coming upon the concessionnaire.' If the declared calorific value is altered the tariffs must be modified in direct proportion of the new to the original calorific value.

The remainder of the decree is concerned with contracts for supply, terms and conditions of payment, control by the conceding authority, penalties for failure on the part of the supply authority, termination of the concession, taxation and arrangements for appeals by either the commune or the gas 'board' arising out of the application of the 'cahier des charges.'

Coke Sales

All this has not interfered with the national campaigns of publicity now going forward. M. R. Dury, Chief of the Service of General Organization to Economic Services of the Direction of Exploitation of Gaz de France (his title is as long as that!) contributes an account of the publicity campaign for coke. In May this campaign started with the two slogans '30% efficiency' and 'Summer Prices.' Lasting for two months the object of this first effort was to recommend to central heating clients the purchase of coke during the spring and summer. All the usual elements of publicity were brought into use, direct and indirect.

Statistics show that the campaign achieved a fair amount of success, already marked during the months of May and June and prolonged into the following months. Stocks during these months—*i.e.*, to the end of August—were substantially down as compared with the corresponding figures of the preceding years, while sales correspondingly increased. Specimens of the posters used in this campaign are reproduced together with a description of the campaign in the press and in the cinema.

Underground Gas Storage

The October issue carried an abstract of an American paper of 1948 on the storage of gas in underground steel tubes, by D. V. Meiller, Staff Engineer of the Public Service Company of Northern Illinois. A sufficient number of cylinders about 12 m. long by 610 mm. diameter, constructed in high tensile (molybdenum) steel, are arranged in series and in parallel and buried in the ground. The gas is under considerable pressure (say, 2,000 lb./sq. in.). It was estimated that a set of gasholders of the classic type would cost three to five times as much as underground storage on these lines for a capacity of about 70 mill. cu.ft.

Town Gas from Heavy Oils

It is interesting to note that our French colleagues are as interested as we are in the possibility of producing a gas of density and calorific value comparable with that of standard town gas from the distillation and/or cracking of heavy petroleum oils. M. Ch. Tixier contributes a comprehensive article on this subject to the November issue of *J. des Usines*

(*Continued on p. 56.*)

ENGINEER versus CHEMIST

Condensed from a paper by J. FOXTON, Assoc.M.Inst.Gas E., M.Inst.F.

On December 12 Mr. Foxton, who is Senior Chemist to the Cheltenham Sub-Division of the South Western Gas Board, presented a paper to the Midland Junior Gas Association. Entitled 'Thirty Years of Carbonisation,' the paper dealt briefly with the development of gas-making plant in recent years and commented on the varying status of the works chemist. The ensuing discussion hinged upon this engineer *versus* chemist theme, and the extracts from the paper published below have been selected as to highlight this interesting controversy.

WHATEVER the plant used for gas making, there is no doubt at all that with trained technical personnel better results will be obtained, but the fact has still to be appreciated by some engineers that there is no economy in doing without such staff. The installation of instruments will not replace the technician. The instruments are the tools of the technician, and it is he who has to interpret the readings supplied by them, and determine what action is necessary.

I feel it is opportune to urge the gas boards to consider how a body of trained personnel is to be built up ready for the time when gas production is centralised in a small number of large works. The time is past when stokers can be elevated to foremen, and foremen to superintendents, unless promotion is the result of study. A comprehensive scheme of training is needed to prepare a man both technically and psychologically to take charge of both plant and labour, in order to obtain the best results from both. Those selected for training will need to have faith in their future in the gas industry. Other industries are in need of fuel technologists, and the gasworks trained youth, being very suitable, has little difficulty in improving his position.

It is generally accepted to-day that the gas industry is highly efficient. In a recent lecture at Birmingham, Professor F. H. Garner stated a figure of 80% thermal efficiency. It would appear that to improve on this presents some difficulty.

Waste heat recovery and insulation have been carried as far on modern plants as seems possible with our present knowledge. Dry quenching of coke would, if put into common practice, give a further supply of steam which could be used to generate electricity, but unless this made an acceptable contribution to the national supply, it would not be worth while.

Manufacture of gas at centralised stations could be standardised at, say, 60% coal gas and 40% water gas, whether from verticals, chamber ovens, or horizontals. A calorific value of 450 B.Th.U. with little variation of specific gravity would allow physicists and manufacturers to make rapid strides towards the higher efficiencies needed in gas-consuming appliances. With the knowledge that the variability would be small, efficiency would be maintained.

The objection to this scheme might be on the grounds that the water gas plant is for peak loads. This cannot seriously be argued today, it being accepted that part of the base load is carried by such a plant. Peak loads could be met by the gasification of oil—perhaps heavy fuel oil, tar oil, pitch creosote, or gas oil. An analysis of the figures given by the Ministry of Fuel and Power and the National Coal Board indicates that the industry may have to find alternative fuels.

Experiments with gas oil in horizontal retorts show that a gas of excellent characteristics can be produced, and calorific values can be controlled by adjustment of conditions. Tests also show that a much greater volume of gas per retort can be made then when carbonising coal. Table 1 shows some analyses of oil gas which were obtained by the gasification of oil in horizontals, differing temperatures being employed. This work was carried out at Cheltenham in 1947 while gas oil was subsidised.

Table 1

Analyses of gases made from oil.

	Deg. C.			
Temperature	900/950	1,200	1,250	1,300/1,320
Carbon dioxide	1.0	4.2	5.1	6.9
Oxygen	0.5	0.2	Nil	Nil
Unsaturated hydrocarbons	3.0	1.0	0.5	Nil
Carbon Monoxide ...	2.2	10.1	11.6	15.3
Methane	36.6	10.6	9.1	2.5
Hydrogen	52.6	72.5	72.5	73.8
Nitrogen	4.1	1.4	1.2	1.4
Calorific value, B.Th.U.	632	382	375	310
Specific gravity ...	0.355	0.296	0.308	0.258

In the case of a works making straight coal gas the programme outlined would result in only approximately 60% of the carbonising plant being used for gas-making, with the resultant reduction in coke for sale. Here, I think, is an opportunity to carry out our adherence to the principle of smoke abatement and coal conservation by carbonising non-coking coals for the smokeless fuel market. The tar oils produced could be used for gasification if required, or processed. Readers who feel disposed can with profit consult the report of the results of the Rugeley experiment, carried out for the former Severn Valley Gas Corporation, Ltd., in which non-coking coals from the top hard seam were carbonised 'neat' in continuous verticals. Experiments with cannels were also carried out at Edinburgh in 1936 by Mr. Jamieson and Dr. King.

It would appear that in our industry a generation must pass before any major change in method of production becomes operative. While a world war has impeded gas research, would it be altogether unfair to say that too much lip service, and not enough practical assistance, has been given to gas research?

Would we have been more progressive if the pioneers of the gas industry had decided to follow up their experiments with oil?

DISCUSSION

Mr. **F. C. Barker** (Birmingham) asked whether there was any medium-sized dry quenching plant?

Replying, Mr. **Foxton** said that, on the question of dry quenching, most forms were wasteful. A source of power was being wasted daily, but until sufficiently strong feelings were aroused among chemists and engineers, the practice would continue.

Mr. **Ward** (Birmingham) thought that the greatest advance in the last 30 years—and one not stressed in the paper—was the improvement in conditions for workmen and labour relations. The question of the gasification of oil was an interesting one. The paper presented to the I.G.E. autumn research meeting by Staines and McKean entitled 'The Production of Town Gas by the Catalytic Gasification of Petroleum Oils' stated that they had gasified up to heavy fuel oils, and that despite varying viscosities, results were similar to town gas. They could not look forward to getting coals of the type required, and yet had to strain every nerve to produce maximum output.

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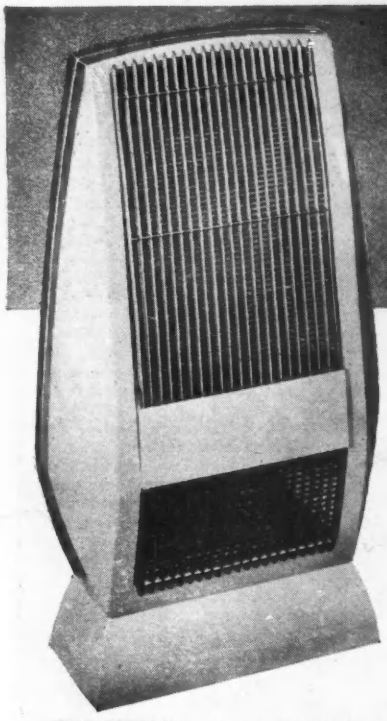

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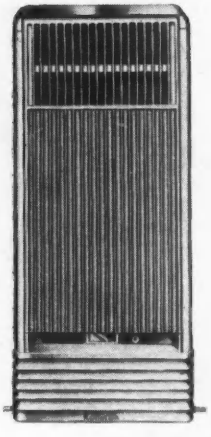

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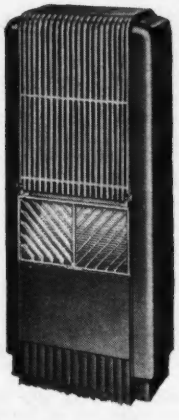

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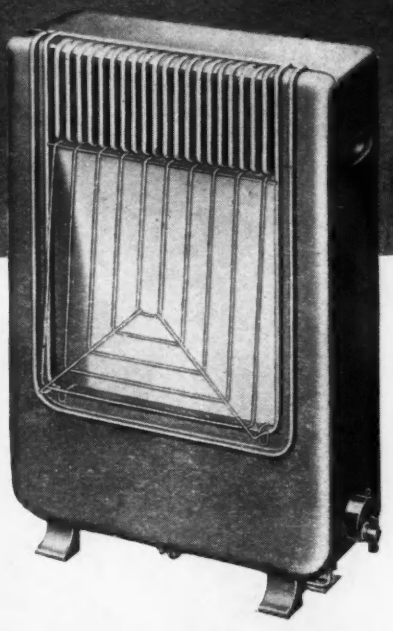

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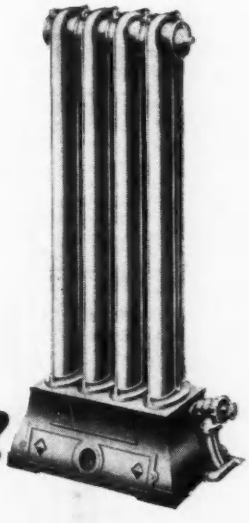

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Water gas was the answer to the problem, and the water gas plant had been used to the maximum at Birmingham for many years; too many undertakings had plant standing idle. The dilution of water gas with producer gas could be used for boosting. With the high outputs required today, it was necessary to have higher throughputs, and the true test of the life of a retort was not years, but tons carbonised. The author had indicated that there were in the gas industry many old fashioned plants, and that there was a reluctance to try out new types. Was that so surprising? Was it better to install something new about which little was known, or something which had proved its worth in practice? That was why wet purification had not been widely adopted, despite good reports.

In reply, Mr. **Foxton** agreed that labour conditions had greatly improved, but pointed out that the title of the paper was 'Thirty Years of Carbonisation' and it was concerned with the production of gas, not with labour conditions. The point was that they had not succeeded in increasing the number of gaseous therms recovered from carbonisation. At Birmingham large loads had been met by employing water gas, but if they were really to consider themselves as a two-fuel industry, it would have been better to meet peak loads by utilising oil, and making more coke available. As a two-fuel industry they had a duty to consumers. He failed to understand Mr. Ward's reasoning concerning new versus well-tried plant. If research was to continue, someone must use the plant and try it. Unless the engineers of the future were prepared to back up their research workers, he could foresee little more progress being made.

Worth Listening To

Mr. **A. R. Myhill** (Birmingham) remarked that he was very intrigued with the title of the paper. Anyone who had done anything for 30 years should be worth listening to. When he had had 30 years as a chemist he had thought as Mr. Foxton did that a chemist should be in control, but now, after 40 years' experience he had changed his mind. It all depended (as Joad would say) on what you meant by an engineer. The man in the street thought of an engineer as having experience of structural or mechanical work. But a gasworks man was almost as much a chemist as an engineer. He had been interested in the author's remarks on the relationship between chemists and engineers. All chemists, particularly the young ones, had met opposition of an undesirable nature. What was the reason? Fortunately, today it did not apply to the same extent as years ago. When he joined Birmingham as a chemist in 1909 he was regarded as a cross between a nuisance and a policeman, and the experience was far from pleasant. Of course, a large number of chemists, particularly those from a university, arrived at a gasworks with the idea that they were magicians. They were far from it, and they were well advised to try to learn something from the foremen and workmen whose advice was not to be despised and might well put them on the right track.

A chemist had two functions, depending upon whether he was senior or junior. There was a call for routine tests and these were a job for the young chemist rather than the engineer. The senior man should be employed as a consultant, and it was a pity more use was not made of him. Co-operation between engineer and chemist was essential, but the latter had to use some tact and must understand the psychology of the engineer with whom he was dealing.

He was particularly interested in the analyses of gases made from oil, but did not think this method should be resorted to any more than could be avoided; it was a messy business. With these analyses at Cheltenham, he was surprised at the temperatures used; even the lowest at 900°C. seemed too high. The amount of carbon must have been considerable, and he would like to know how these figuers were obtained. The paper by Stanier and McKean was of great importance and would have considerable bearing on gas-making in the future. As the treatment of crude petroleum grew, a market must be found for the residuals.

Replying, Mr. **Foxton** agreed about chemists. For some reason they were always subordinate to the engineer, although in many cases they were his equals. It should be possible to qualify a man as a chemical engineer, a distinction which would smooth out many of these difficulties. The Cheltenham analyses referred to by Mr. Myhill were obtained experimentally in an investigation to discover whether a gas comparable with town gas could be obtained. Unfortunately, the apparatus was crude, and the people directing the work were so enthusiastic that as soon as the residue appeared, the work was stopped. Work had also been done adding air, and a C.V. of 440-450 had been produced without carbon. The gas had a special offtake through a scrubber, but the carbon did not appear to be much.

Mr. **Milner** (Worcester) thought the average engineer's attitude to the chemist might be summed up in the words: 'It sounds a fine theory, but for goodness sake do not develop it at our works.' Fortunately the friction between chemist and engineer which existed 35-40 years ago had largely died out, and today the chemist was genuinely appreciated on the works. He disliked the reference made to chemists who had or had not been university-trained; it did not take long to find out whether they were any good, and their place of education had no bearing on the matter. He believed that in another 30 years with improved refractories, some higher temperatures might be obtained.

Mr. **Foxton,** in reply, said that even with an improvement in refractories, the actual therms produced would remain much the same, but there would be an improvement in throughput. There was really no limit to the temperatures to which one could go.

Mr. **J. M. Brown** (Birmingham) thought it unfortunate that the discussion had deteriorated into an acrimonious argument on how one should run a gasworks and on the relative merits of engineers and chemists. The latter point was utterly irrelevant, and members might note with advantage that in an American survey of business methods, several thousands of business executives put 80% of their success down to a capacity for dealing with human beings and leading men, and only 20% to technical knowledge. He queried the author's statement that vertical plant ensured a very constant gas quality. He could claim 20 years' experience of verticals, and in a paper which he had presented to the Manchester Juniors ('Carbonising in Continuous Vertical Retorts') he had shown the fluctuations in calorific value from a vertical retort house. He felt that the discussion had tended to emphasize their dependence on oil. In his view this was a short-term policy. Although a lot of refineries were being built in this country, they did not know what supplies would be available, and as far as he could see they were dependent on coal for hydrocarbons in this country. They might say that they 'couldn't care less' whether existing coalfields lasted 200 or 400 years; but geologists thought that oilfields would last a considerably shorter time, and it was important that they should not be misled over this oil business. It would meet a need in the immediate future, but the real problem which the younger generation had to face was how to get a better yield from hydrocarbons in this country.

Importance of Handling Men

Mr. **Foxton** agreed with the speaker's comments on the importance of handling men. After 30 years he himself had forgotten much of his chemistry and gas engineering, and relied primarily on a knowledge of how to talk to people and get a job done. With regard to oil versus coal, it depended on what was meant by a short or long term policy. Graphs showed the decline in the amount of coal produced and the increase in electricity generation and in the amount of gas required. In order to meet these peaks, it was clear that they could not rely on coal, and must find some alternative fuel. How were they to get an increase in therms per ton? There was a limit to how far they could go with water gas. One alternative was to stop making a present to the tar distillers at 2d. per therm. If they could convert only half of that into therms they would be much better off financially. The field to be explored, therefore, was the further cracking of tar.

Mr. **C. Gilbert** (Birmingham) complained of the slow manner in which the industry applied the results of research. He suggested that present legislation was one of the reasons. They were obliged to fulfil certain requirements concerning quality of gas and freedom from H_2S. The whole question of liquid purification had been held up because people were frightened that it would not purify to the limits they had to adopt. The industry remained undecided whether it was a one or two fuel industry. Complete gasification had been similarly held up; the author suggested a mixture of 60% coal gas and 40% water gas, which would reduce the coke available for sale by 40%. Everyone was concerned over the availability of coke, and to gasify it at a time when the demand for coke was at its height hardly seemed prudent. The gasification of it—for peak loads only—was most desirable. He was not sure if the author meant them to use

horizontal retorts for a long-term policy; the plant indicated by Stanier and McKean would seem to have much to commend it. Residual fuel oil had come into the picture in the last few months, and gas engineers seemed to regard it as a lodestone at the present time. People would be ill-advised to consider that this supply of fuel oil was unlimited.

Mr. **Foxton** agreed that statutory requirements presented many obstacles, but it was up to men of initiative to overcome them; the whole matter lent strength to the necessity for using research. Mr. Milner had remarked that the principal interest of the engineer running a works was to know that his plant could make gas. Of course it was, but a conservative attitude towards research resulted in a lack of progress. The whole thing resolved itself into a need for initiative. With reference to the mixture of coal and water gas, the percentages were only a suggestion. The gas industry could make a standard gas, but what that standard would be must be fixed by those who knew the economics of the industry. They would be guided by research and what was the best type of gas to produce. That sort of decision was rather beyond the scope of the Association; it would merely be their job to support such a decision. The question of coke production was, of course, affected by water gas. If they ceased to make water gas, and gasified oil, even if the work was done in horizontal retorts, it would result in more coke. It would require a smaller number of retorts to produce oil gas than coal gas, but as the previous speaker had said, it depended on whether the gas industry was supposed to produce one or two fuels. It was just not good enough to claim to be a two-fuel industry and then fail to supply the solid fuel for which a demand had been built up.

Mr. **J. M. Grundy** (Derby) commented that they had to make over 50% water gas, with the result that the specific gravity varied from 0.47-0.56; the distribution department did their best to adjust appliances accordingly. The gasification of oil in retorts was a process which seemed to offer an opportunity for low specific gravity, and he wondered if this was feasible in view of existing requirements. Was this process carried out in an empty retort, or one which had been filled with carbonised coke?

Mr. **Foxton** replied that this particular gas was made in an empty retort; later the retort had been filled with pre-cast chequers and air added, but the nitrogen did not exceed 9%. The process was adaptable, but these were purely experimental figures. They had had no means of measuring carbon, although both oil and steam could be measured. He understood that the Power Gas Corporation was making a plant for the South Eastern Gas Board, and he imagined it would be more simplified than a carburetted water gas set, and possibly with quicker delivery. On the question of percentage of water gas, he knew of one undertaking which at times manufactured up to 70%.

Mr. **D. J. O. Bath** (Oxford) remarked that the gas industry had a duty to the consumer—to produce the cheapest possible therm and develop its maximum utilisation. In his view, the most notable development was the degree of mechanisation and the reduction in fuel consumption of the plant used. In his paper Mr. Foxton advocated refresher courses for technical personnel. Surely the first step was to ensure that personnel joined an association such as the Midland Juniors and attended its meetings?

Mr. **I. F. Millar** (Dudley) suggested that there were two points deserving further discussion. One was the inconvenience of scurf. They had to accept 10-15% working capacity lost by plant standing by for scurfing. Several cures had been suggested, but it would be helpful if someone could give advice on removing scurf quickly and on cutting down the amount of scurf forming. It prevented heat transmission in the retort, and if this bogey could be got rid of, it would increase carbonising efficiency and result in a greater overall thermal efficiency. The other point was flue cleaning and the old trouble of ash fusion on silica work. Mechanical producers might cut down the amount of ash carried through, but was there anything which could make a normal built-in producer more efficient? The dust problem was causing some of them more trouble than anything else.

Mr. **Foxton** replied that on vertical or intermittent ovens, the period between discharging and charging was almost sufficient to burn off the scurf. There was little free space in the retort itself, the chambers being almost full to the top. If horizontal retorts were charged to capacity there was little scurf formation.

A vote of thanks to the author was proposed by Mr. **D. J. Ward** (Birmingham) and seconded by Mr. **R. B. Watkins** (Coventry).

GAS IN FRANCE — continued from p. 49

à Gaz. As with us it is a question of making an oil gas which can be substituted as occasion requires and particularly to meet peak loads, for coal gas, that is to say, as similar as possible in properties and composition. M. Tixier outlines the history of oil gas and discusses the theory of cracking. Cracking by simple pyrolysis leaves a residue of carbon which it is possible to eliminate by gasifying it in one of three ways: by means of air, steam, or a mixture of air and steam. The gas produced by the first method responds to the requirements of a substitute for town gas by its calorific value, but is not acceptable on account of its high carbon monoxide content and its excessive density. By the second method the calorific value is so high that it can only be used as an enricher of a poorer gas. Its density, 0.61, is high without being inadmissable. Gas by the third method comes nearest to the requirements of a substitute gas. Theoretically, none of these gases come up to requirements but in practice it is possible to obtain a satisfactory substitute gas provided that, on the one hand, the total cracking of hydrocarbons may increase the hydrogen content and reduce that of methane and ethylene, and on the other hand, a part of carbon monoxide may be converted to the dioxide by partial combustion in the air and steam.

Pyrolysis and Catalysis

Since the resultant of the complex reactions in cracking are finally endothermic it is necessary to supply heat to obtain a satisfactory gasification. It would appear that the simplest way of doing this, particularly with heavy oils in view of their low price, is to utilise a portion of the oil for heating. Two methods are suggested, internal heating pre-supposing a cyclical process and external heating which may lead to a continuous process. The second is much the more simple, but it requires a temperature too high for the reaction tube even in heat-resisting steel. It is to obviate recourse to so high a temperature that the use of catalysis has been suggested.

The oils which are most suitable for gasification by cracking are evidently the 'virgin' oils richest in hydrogen, that is to say oils which have not been cracked in the refinery, and among these gas oils and paraffin distillates rather than fuel oils. But because of the low price of the last named it was necessary to make an effort to gasify them satisfactorily.

Three processes to this end are briefly described: the Hall process, the ONIA process and the Givaudon. The ONIA process has reached the stage of a pilot plant at Cahors, the Givaudon process is ready for trial on a semi-industrial scale. 'The ONIA process which realises the catalytic conversion of fuel oil, with external heating, in the presence of air and steam is of particular interest to the gas industry in France for the following reasons—though proceeding by cycles each in two phases, the one of gas making, the other of desorption of the catalyser, the production is the more regular in quality as the cycles are of long duration at least for the gas making phase —the gas produced is a direct substitute for town gas both because of its carbon monoxide and hydrogen contents and of its calorific value' (4,200 cal/cu. metre, say 440 B.Th.U./cu.ft.). The process lends itself better than the Hall process to the small units of production suited to a great number of French undertakings. The thermal efficiency of the process, in a small installation (150 cu. metre/hour), approaches 70%. Tests to be conducted at Cahors in a plant of this capacity will permit exact information to be obtained on its flexibility and economy.

The Givaudon process is a continuous one with oil carried on graded grains of alumina. It is similar to plants for the complete gasification of coal, the oil-impregnated alumina grains taking the place of the coal.

The operation comprises four successive phases during the vertical descent of the impregnated grains. In the first phase

(*Concluded on p. 63*)

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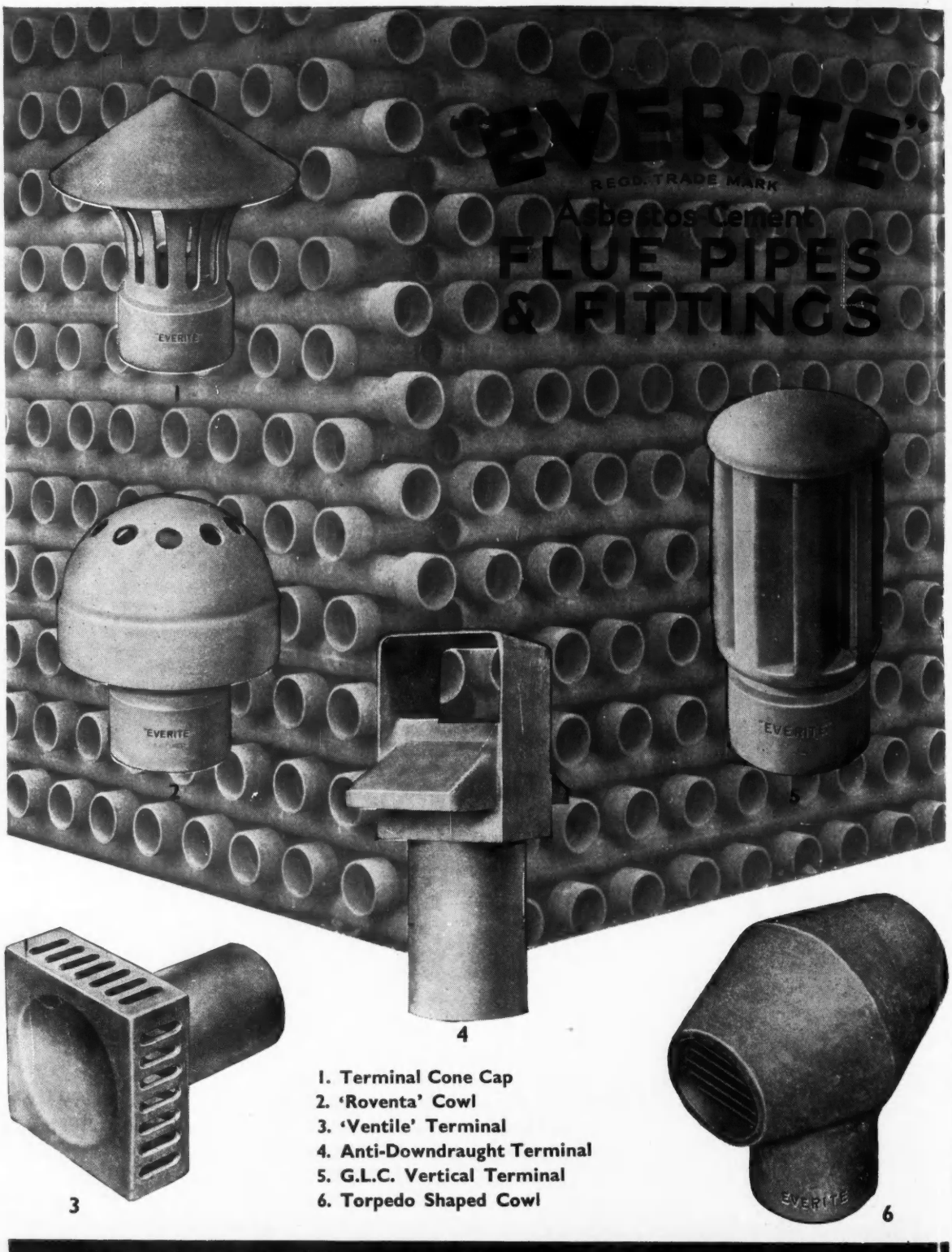

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MANUFACTURE OF SMOKELESS FUEL

By D. T. PHILLIPS,

A.M.I.Chem.E., M.Inst.F.

In the following paper to the Wales and Monmouthshire Junior Gas Association on December 7, the author foreshadows in the near future a rapid increase in the sale of coke oven gas—with a consequent still greater reduction in the amount of coke available. He urges that the gas industry should continue to be a two-fuel industry and that plants should be erected for the production of smokeless solid fuel from semi-caking and dry steam coals. To this end he describes the production of ovoids from coal/pitch mixtures and their subsequent carbonisation.

I BELIEVE that insufficient attention is being given to the possibility of upgrading the fine grades of coal which are produced in large quantities during the washing, sizing, and mechanical breaking of semi-caking and non-caking coals.

The gas industry should be preparing itself to meet the requirements of the domestic market, not only with gas, which is the ideal smokeless fuel, but also with solid fuel. The public will demand smokeless, solid fuel for very many years to come.

The demand for domestic solid fuel has hitherto been met by anthracite, sized and graded coke, and semi-bituminous and steam coals.

Anthracite coals are in very short supply and very expensive. The proportion consumed domestically is about 2.5%. Anthracite coals are also of limited application because, generally, they are difficult to ignite. Sized and graded cokes are being used domestically but the consumption is mainly confined to central heating boilers and special stoves and grates.

The present policy of integrating gas undertakings and of taking increased supplies of coke oven gas will markedly reduce the amount of gas coke available. The great bulk of the domestic requirements is still met by bituminous coals, which represent about 95% of the domestic, solid fuel consumed.

The reserves of anthracite, mainly in South Wales, are huge, and it should be possible to secure an increase of several million tons in the annual output, but the coal will still be very expensive and of limited application. The production of gas coke will steadily decline and, in any case, its application is limited. There are immense reserves of dry steam coals (volatile content 10%-14%) available in this country, mainly in South Wales, and I believe that the mining and preparation of these coals should be accelerated.

I consider that the ideal domestic, solid fuel should conform to the following minimum requirements:—

(1) Consistent in size and quality.
(2) High density.
(3) Low ash content.
(4) Clean to handle.
(5) Strongly resistant to damage by breakage during transportation.
(6) Easily ignited.

The foregoing minimum requirements can be met only by a carbonised smokeless briquette prepared from the finer grades of semi-bituminous and dry steam coals, with or without admixture of non-caking coals and breeze. Such a manufactured fuel, or artificial anthracite, can be produced to meet all the requirements of the ideal smokeless domestic fuel.

Development of a Suitable Process

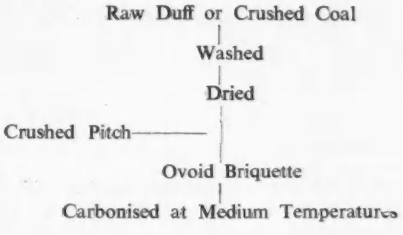
Much work has been carried out during the last 25 years, both in this country and abroad, in a serious endeavour to perfect a process which would be of universal application and both commercially and technically sound. Many of the would-be developers made extravagent claims for the processes long before they had been thoroughly tried out, and consequently they fell by the wayside.

The following are among those who have carried out the best work and developed processes which are undoubtedly sound :—

(1) H.M. Fuel Research staff.
(2) Dr. Paul Dvorkovitz.
(3) Dr. S. Roy Illingworth.
(4) The 'Suncole' process.
(5) Humphreys and Glasgow, Ltd.
(6) Powell Duffryn Associated Collieries, Ltd.
(7) The Disticoke Company, Paris.
(8) Sutcliffe, Speakman, Ltd.

I am privileged in having been associated directly with Dr. S. Roy Illingworth as one of his students (1923-27), with the late Dr. Paul Dvorkovitz as his chief chemist (1928-31) and with the Powell Duffryn Associated Collieries, Ltd., as engineer and manager of their Phurnacite plant (1936-42). The people with whom I have been associated all attacked this problem in a similar manner, the main differences being the grade of coal used in the process employed and the type of retort used to carbonise a pitch-bound, raw-coal ovoid.

My experience tells me that the ideal smokeless briquettes can be produced from raw, dry, steam coal by the following typical scheme :—



The most acceptable grade of coal would be a dried, washed, duff coal, the main requirements being that the coal should be reasonably dry, of low ash content, and fairly granular with freedom from dust below 60 mesh B.S.S.

The Briquetting Process

The technique of briquette and ovoid manufacture from coal/pitch mixtures is fairly well established but it is necessary to take much greater care and work to finer limits if a suitable ovoid is to be manufactured which will stand subsequent carbonisation with a high yield of unbroken ovoids.

First the raw coal is fed to hopper and raised by bucket elevator to blending bunkers. The coal is then blended on a scraper conveyor and elevated to a dryer. The dried coal is fed away to a conveyor.

The lump pitch, after a preliminary breaking to 3 in. lumps, is discharged to a hopper and taken by conveyor to a primary pitch breaker. The broken pitch is then elevated to a storage hopper and the correct proportion (6%-10%) is measured by a conveyor, from which it is discharged to meet the dried coal.

The correct mixture of coal and pitch is then passed to a magnetic separator, whence it is passed to a squirrel-cage type of disintegrator. The disintegrated coal/pitch mixture is

then passed through a paddle-type mixing conveyor, whence it is elevated to a pug mill.

Great care is necessary in proportioning and mixing prior to pugging, in order to ensure an ovoid of the correct strength and texture with the minimum usage of pitch.

The mixture is fed to the top of the pug mill, in which it remains for about 7 min., and is heated by the direct injection of superheated steam at a temperature ranging between 400° and 700° F, when at a pressure of about 25 lb./sq.in. Thorough mixing is obtained by paddles on a vertically-disposed rotating shaft.

The pug mill is probably the most important item of the plant, because it is imperative at this stage that the complete fusion of the pitch and its uniform dispersion through the mass must take place.

Many pitches have been tried but the best results are obtained with a medium hard pitch with the following characteristics :—

(1) Softening point — 75°-78° C Ring and Ball test.
(2) Free carbon — 12%-15%.

The mixture is then passed to a paddle-type conveyor where it is 'tempered' to the correct degree for briquetting.

The 'tempered' mixture is fed, under careful control, into a press-feed pan standing immediately above the rolls. Where it is agitated by horizontally rotating paddles, so as to ensure an even distribution to the feed-boxes to the rolls.

The design of these brass-lined feed-boxes has necessitated much research in order to produce a box which will ensure a regular feed across the entire face of the press rolls, in order to produce ovoids with a reasonably uniform crushing strength. The ovoids are discharged from the rolls, after being pressed at roughly 2 tons/sq.in., on to a short conveyor screen which removes the fine material which is returned to the pug mill.

The ovoids then pass on to a special wire-mesh matting type of conveyor where they are cooled and hardened prior to being fed to a storage hopper in readiness for subsequent carbonisation.

Carbonisation of Coal/Pitch Ovoids

The raw ovoids produced from coal/pitch mixture would make a very useful domestic fuel, but it is essential that they should be carbonised if a really high-class fuel is to be produced and marketed.

The carbonisation of raw ovoids produces the following advantages:—

(1) The carbonised fuel is smokeless and the residual volatile matter in the fuel can be controlled to render it suitable for various uses.
(2) The crushing strength of the fuel is increased by about 600% provided the residual volatile matter does not exceed 6%.
(3) The bulk density is comparable with that of the best anthracite nuts.
(4) Grate tests indicate that ignition need not be difficult; the fuel burns for a long period with a high degree of radiation.
(6) The percentage degradation is very low in transit and storage. (Less than 2%.)
(7) The fuel is received by the customer with a uniformity in size as high as 97%.

Thermal Output of Carbonised Ovoids

The thermal output of carbonised ovoids is excellent during the first stages of combustion but suffers during the later stages due to the masking of the fuel by fine ash. It so happens that a high percentage of the non-caking and dry steam coals have ash contents which are of a calcareous nature and with a high fusion temperature. Such ash is white and of an objectionable nature even with the concentration as low as 5% by weight of the fuel.

The ash characteristics can be altered chemically by the addition of various inorganic substances, such as borax, lime, and natural iron oxides.

This process is generally known as activation, and the main effects on the characteristics of the ash are:—

(1) Darkening in colour (white to brown or red).
(2) Reduction in the amount of fly ash.
(3) More granular ash of a sintered nature.

In general, the desired fluxing effect can be achieved by an admixture, during the process of ovoiding, of almost any form of iron oxide in amounts which will produce the equivalent of 0.5% to 0.75% of elemental iron in the ovoid.

There are many forms of naturally occurring rocks which contain ferric and ferrous iron, but one of the most easily obtained is the 'brass-stone' found in heavy nodules in the 'roof' during the mining of coal seams.

I give below a typical analysis of such a stone:—

Ferrous iron as FeO	30.27%
Ferric iron as Fe_2O_3	10.21%
Sulphur	1.86%

Such a stone when finely ground would be added to the pitch/coal mixture prior to ovoiding, and the addition of 1.5%-2.0% would produce the required amount of iron to achieve the correct degree of ash sintering.

Methods of Carbonisation

Many methods of carbonisation have been tried, both in this country and abroad, notably in France, with varying degrees of success. Many processes ceased to operate because they were unsound technically, others due to lack of adequate finance.

The best methods could be divided into two main categories:—

(1) By external heating in ovens and retorts.
(2) By internal heating in vertical retorts.

I have been privileged to carry out extensive work on both systems and I give it as my opinion that carbonisation by internal heating is supreme. It is a fact, however, that the only really big and successful ovoid carbonisation plants operating in this country and on the Continent consist of narrow, inclined, chamber ovens.

The carbonisation of coal/pitch ovoids in chamber ovens is basically the same as coke oven practice. The technique employed for carbonisation by internal heating is not well known and I think a short description of a typical system may be of interest.

Carbonisation plants of this type have been operated by a number of authorities during the last 30 years or so, but I think the most successful would be:—

(1) Dr. Paul Dvorkovitz.
(2) Humphreys and Glasgow, Ltd.
(3) Powell Duffryn Associated Collieries, Ltd.
(4) Rational Carbonization Syndicate.
(5) Positive Retorts, Ltd.
(6) Disticoke, Ltd., Paris.

The plants developed by various concerns differ very little in the main features. The principal differences are in detail, such as:—

(1) Method of charging the retorts.
(2) Type of gas circulating fan employed.
(3) Gas pressure maintained in the system.
(4) Method of heating and circulating gas.
(5) Methods of discharging the carbonised fuel.
(6) Absence or otherwise of supplementary external heating of the retort.

Briefly, the basic technique is as follows:—

Raw fuel is fed into the top of a vertical retort 20 ft.-30 ft. high and 3 ft. 6 in.-6 ft. internal diameter. The retort is usually circular in section and consists of a mild steel shell lined with

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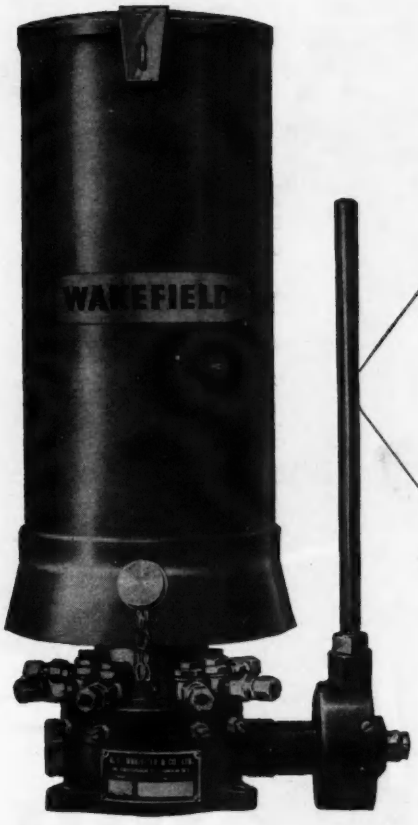

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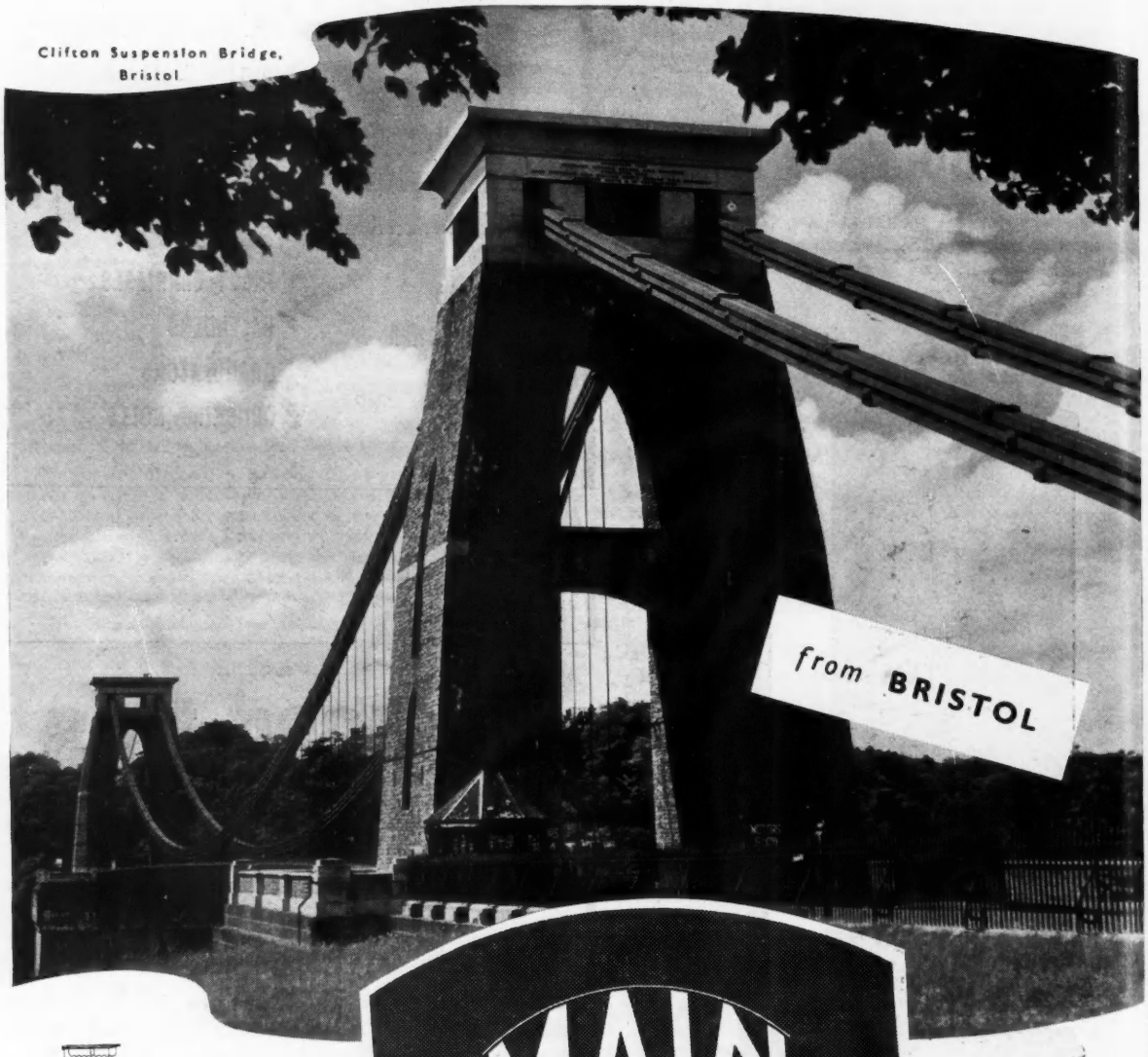

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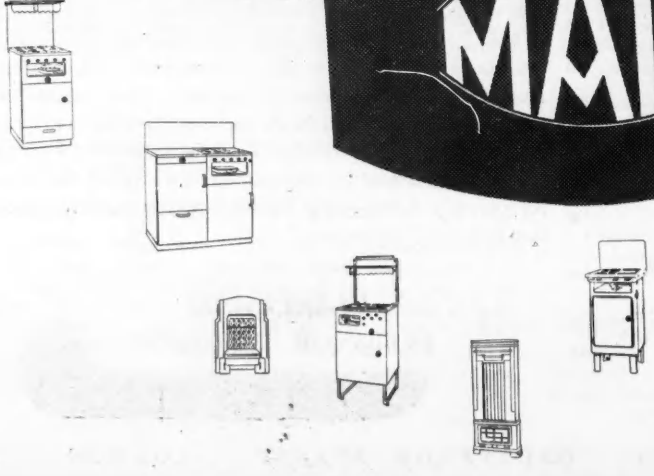

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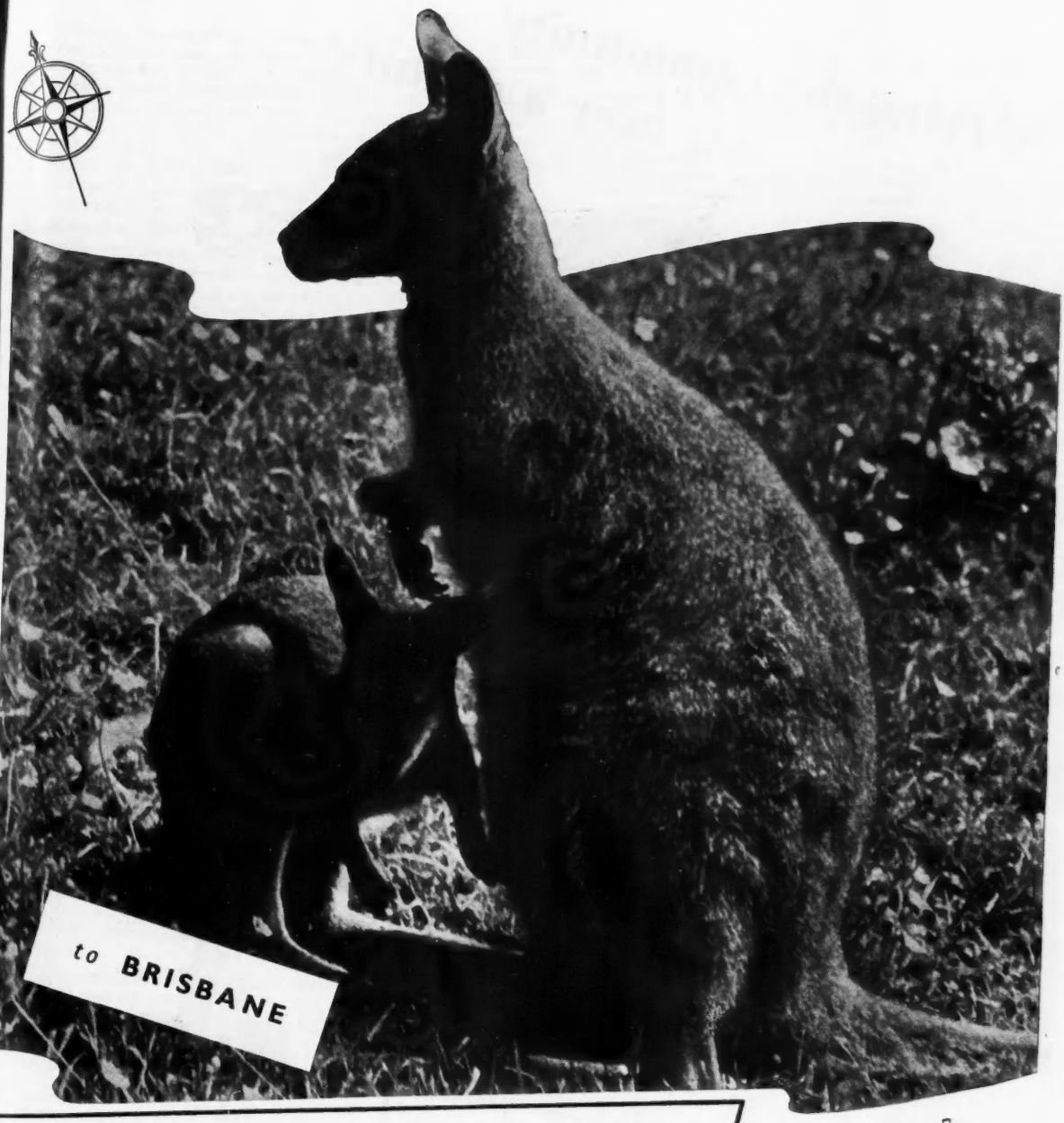

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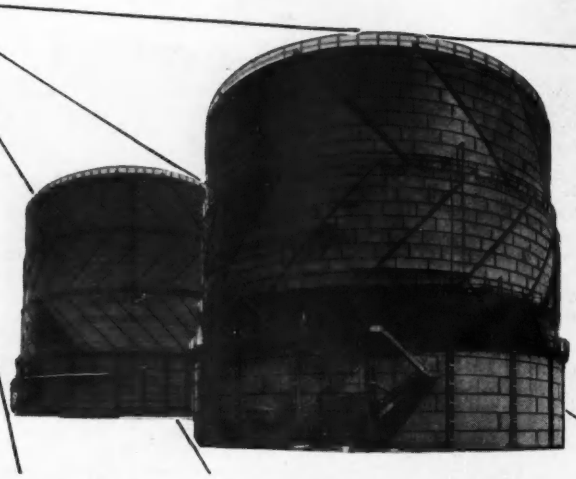

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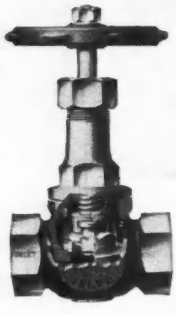

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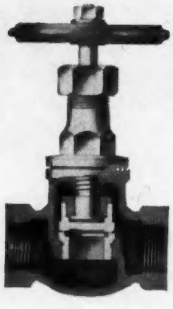

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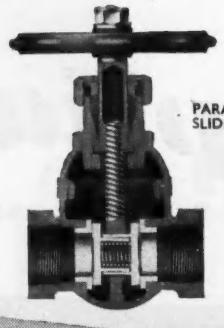

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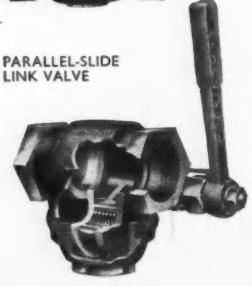

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firebrick. Sometimes the retort is surrounded by masonry flues carrying waste gases at 600° C. Carbonisation is achieved in the top section by a stream of heated coal gas passing from a preheater which may take the form of a normal regenerator, heated intermittently on a time cycle by the combustion of coal-gas, or it may operate continuously by employing steel or refractory tubes, which are continuously heated by the combustion of coal gas.

The stream of circulating gas is normally heated to a medium temperature (850°-900° C) and then passes on through the body of coal/pitch ovoids contained in the retort.

The raw ovoids may be fed down through the retort, either continuously or by semi-continuous methods of batch charging. The stream of heating gas leaves the top of the retort together with the gas and tar evolved from the raw fuel and is passed through the normal train of condensers, tar precipitators, washers, etc. The gas, thus freed of tar, pitch, and dust, is passed to a fan for recirculation, under pressure, to a gas preheater. In such a system the gas pressure will obviously increase during the period of carbonisation. A constant pressure is maintained in the system by means of a release valve, which may be of the Arca or Bryan Donkin type. This valve will release excess gas, via a scrubber, to a balance gasholder.

If, for any reason, there should be a reduction in pressure of the gas in the system, then the gas fan would automatically take gas back into the system from the balance holder via a seal pot.

Cooling of the carbonised fuel can be achieved by passing a portion of the stream of cooled gas up through the bottom section of the retort. The final cooling of the carbonised fuel is achieved in the normal manner by water quenching after the fuel has been discharged from the retort.

The Carbonised Fuel

The production of carbonised fuel by means of internal heating has the following advantages:—

(1) Heat distribution is extremely good and the resulting fuel is of uniform quality and free from distortion or agglomeration.
(2) The heat transfer is high and the carbonising temperature control flexible and accurate.
(3) The heat necessary for carbonisation is as low as 17/20 therms per ton.

The degree of degradation of the fuel during the process of carbonisation is extremely small and it is possible to produce 92% of unbroken fuel, with 6% of broken ovoids and 2% of breeze.

The nuts produced make an excellent stove fuel and the breeze can be recirculated to the briquetting plant. The residual volatile matter in the fuel should be controlled so as not to exceed about 6%.

Processes of the type described produce a high-quality gas. The quantity will, naturally, be governed by many factors, such as:—

(1) The volatile of the original raw coal.
(2) The quantity and quality of pitch used.
(3) The carbonising temperature.

When operating with dry steam coal (V.M., 10%-14%) briquetted with pitch (7%-10%) at medium carbonising temperatures (850°-900° C) with a residual volatile matter in the fuel of about 4%, the surplus gas would amount to roughly 3,000 cu.ft./ton of raw fuel.

Carbonised Fuel and the Gas Industry

Many of my friends and colleagues may well demand to know how the carbonisation of semi-caking coals is connected with the gas industry. The present trend of integration, with the replacement of gasworks supplies by coke oven gas, is bound to result in a serious reduction in the available supplies of gas coke. I believe that we shall see in the very near future a fairly rapid increase in the sale of coke oven gas by gas undertakings, with a still greater reduction in the amount of gas coke available.

The gas industry produced about 13½ mill. tons of coke and breeze during 1948-49. I cannot say what proportion of this production went to domestic premises, but it is obviously only a fraction of the domestic smokeless fuel required. The gas industry has nearly 12 mill. consumers, of which 7,664,000 are prepayment consumers. It can safely be claimed that about 9 mill. domestic premises have gas supplies and each one of these premises consumes solid fuel in at least one appliance.

With these important facts in mind, I suggest that 'Mr. Jones, the Gas,' may rightfully regard himself as being in intimate contact with the fuel problems of nearly every home in this country. I suggest, too, that he should think that he is the man who should be giving serious consideration to the ways and means of meeting the solid smokeless fuel demand. The Gas Industry should continue to be a two-fuel industry, and plants should be erected for the production of smokeless solid fuel from semi-caking and dry steam coals. The industry has a vast and efficient organisation which covers every area of this country and an intimate contact with the domestic fuel problems of 9 mill. homes. Surely, we are not content to visualise a future where we shall be the mere retailers of gas produced for us by the coke oven industry. I suggest that we should all give much more thought and attention to the preparation and sale of solid fuel and appliances, and that such a line of attack would be of great benefit to the consumers, to us as managers, and the industry in which we serve.

GAS IN FRANCE — Concluded from p. 56

pyrolytic decomposition of the oil takes place with the evolution of a gas at about 9,000 cal/cu. metre (940 B.Th.U./cu.ft.) and with the deposition of free carbon on the alumina grains, the necessary heat coming from the following phases. In the second phase the remaining oil and the free carbon react with steam injected at the base of the apparatus and superheated by the combustion of the carbon in the third phase. In the third phase the free carbon remaining after the second phase is oxidised by the air pre-heated in the fourth phase. In the fourth phase, the grains of alumina now free from carbon and oil are cooled by the incoming air. The calorific value of the gas is relatively low—3,780 cal/cu. metre, say 400 B.Th.U./cu.ft. The process is attractive by its simplicity. Further tests on the semi-industrial scale will show what can be expected at the full industrial scale.

Miscellaneous

Further items in the *J. des Usines à Gaz* include an elaborate study of pressure losses in mains carrying different gases, coal gas, natural gas, propane and the air-propane mixture; a report of a ministerial decree setting up a 'Commission for the study of security measures to be observed in the installation and operation of mains carrying combustible gas'; a report of the first Congress of the National Institute of Safety for the prevention of industrial accidents and occupational diseases; an account of the official opening of the laboratories at Verneuil-sur-Oise of the research department of the French coal industry (CERCHAR); and a speech by M. Kec on the gas industry during the last 50 years.

The coal situation in France continues unfavourable, difficulties of supply continue to increase. Gaz de France holds a stock equal to 36 days' requirements. Foreign producers maintain or increase their output, but their own needs grow faster. A deficit of about a million tonnes is anticipated. Increases of pay awarded to miners are equivalent to an increase of 3% in the cost of coal, but a general increase in price has not yet been announced and no provision for it has been made in the price of gas to January, 1951.

The British Road Tar Association has prepared a booklet in order that road tar suppliers, surveyors and other users of road tar might have, in readily accessible form, a summary of the relevant British Standard Specifications and other publications. Surveyors particularly will find it useful when they are dealing with their tenders.

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COMPANY NEWS

Albright & Wilson

The directors of Albright & Wilson, manufacturers, among other things, of treatments for corrosion control in water pipes, announce that the issue of one 5s. ordinary stock unit for each 5s. stock unit held, agreed at the meeting on September 19, can now be effected following High Court approval to the variation of the rights of the 6% original preference shares. Stock certificates will be posted on January 15 to stockholders registered on December 29. The new stock will rank equally with the existing ordinary stock for the final dividend payable in respect of the year ended December 31, 1950.

Turner & Newall

Turner & Newall, manufacturers of asbestos products, is raising its distribution on the £5,338,609 ordinary capital by 5% for the year ended September 30. The final dividend is increased by 2½% to 13¼% and is accompanied by a special anniversary bonus of 2½%, against nil, making with the interim a total of 20%, less tax, against 15% for 1948-49. The preliminary statement shows that the consolidated net profit increased by £880,389 to £7,154,468 compared with the previous year. After providing £618,967 more for taxation at £4,193,553, the net profit is £261,422 higher at £2,960,916. The consolidated net profit is struck after charging depreciation and other provisions totalling £2,441,028, against £1,483,347 for the previous year.

Midland Tar Distillers

An interesting feature of the accounts is that there are still capital commitments for £625,000 after heavy expenditures in recent years. Presumably this means that the plans for centralisation of refining are well under way, and also that in due course the undertaking will be raising additional capital, as foreshadowed at the meeting last January. A programme of the magnitude suggested would place an excessive strain on the finances as they stood at June 30, when previous developments had reduced the cash holding from £149,000 to £56,000. The movement is small, however, in relation to the expansion of fixed and current assets. The better results obtained in the past year are ascribed to the form of contract under which the company obtains its tar. The price to be paid varies inversely, in effect, with the volume of capital expenditure. Large outgoings thus mean an increased working profit, although they also call for increased depreciation allowances by the company. Consolidated trading surplus to June 30, £364,065 (£328,680), plus other income £3,940 (£4,231). After depreciation £94,511 (£78,651), taxation £117,076 (£111,909), taxation equalisation re initial allowances £30,800 (nil), replacement reserve nil (£20,000), etc., net profit £96,171 (£92,712), plus tax adjustment £3,875 (tax, etc., £28,750). Retained in subsidiaries £3,896 (£11,608), balance to Midland Tar Distillers £96,150 (£109,854). To preference dividend £5,536 (same), ordinary £29,700 (same), tax equalisation £60,000 (general reserve £70,000), forward £60,236 (£59,322). There is ample cover for the maintained 8% dividend, and the surplus is used to provide against earlier initial allowances.

Stewarts & Lloyds

Stewarts & Lloyds, tube manufacturers, are paying on January 31 an interim dividend of 6%, less tax, on the deferred stock and at the same rate relatively on the liaison deferred shares. The total distribution for the year will not exceed the 12½% paid for many years owing to the operation of the Iron and Steel Act. It has not been the company's practice to pay interim dividends on the deferred stock but to make a single payment towards the end of May. The directors state that the deferred dividend for 1950 could be paid somewhat earlier, but it will not be possible to pay the full dividend before April 5 next. Further, it will not be possible to pay the dividend on the deferred stock for the 45 days from January 1, 1951, to February 14, 1951, before April 5. Vesting date is February 15. Assuming that a full year's interest on the Iron and Steel stock will be paid within the fiscal year 1951-52, the deferred dividend, together with the interest on the Government stock, may be approximately twice as much as the deferred dividend already paid in the current fiscal year. In order to even out the amounts received by deferred stockholders as between the current and next fiscal year, the directors have declared this interim dividend.

Cannon Iron Foundries

The 16th ordinary general meeting of Cannon Iron Foundries, Ltd., was held on December 19, at Deepfields, near Bilston, Staffs, Mr. A. F. Oatley (chairman and managing director) presiding. The following is an extract from his circulated statement: The continued progress of your company is again reflected by the achievements for the year. With a new record trading and net profit, a record output, and a widening of sales distribution, it is further justification of the re-organisation and forward planning policy initiated in the early post-war period which has yet to reach full development. Our net profit at £406,371 shows an increase of £85,813 over that for the previous year. The apparent small increase in capital and reserves from £825,090 to £837,625 does less than justice to the achievements of the year. The appropriation account, however, shows profits ploughed back of £160,303 and taxation provisions no longer required of £52,361. To that total of £212,664 must be added excess profits tax post-war refund of £5,065, giving a total improvement in available funds of £217,729. The result of the improvement of £217,729 in shareholders' funds plus an increase of £41,178 in the reserve for future taxation is an increase in net assets of £258,907, and as fixed assets have decreased by £6,227 net current assets have increased by £265,134 to £818,287; an uncommonly strong financial position.

The Middlesbrough Town Council has been informed that under a new scale of charges laid down by the Northern Gas Board, it will have to pay £6,231 more annually for its gas. A motion protesting against the increase was rejected at a meeting of the Council by 30 votes to 15. Some members of the council contended that while Middlesbrough would pay more for its gas, people living in surrounding areas would pay less.

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CONVEYORS FOR coke HANDLING

THE fine, modern Decel conveyor has a performance as outstanding as its appearance. Designed for loading and unloading trucks and stacking, this conveyor will handle boxes, bags, sacks and crates up to 2 cwt. each. The strong steel frame is completely enclosed and the conveyor is fitted with pneumatic tyred wheels so that one man can easily move it around the factory. The conveyor stands 6′ 6″ high and can be turned in its own length (12′ 0″). The rubber belt is driven by an electric motor or petrol engine.

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TYPE 'A'
for handling bags, sacks boxes etc.

PUT TIME *ON YOUR SIDE*

Working with one of these machines, four men handled 400 x 56lb. bags (10 tons) on to a wagon in 25 minutes. Formerly, this job occupied six men for 50 minutes. *A two-thirds saving in labour costs!*

For handling loose coke, the Decel Troughed conveyor Type 'C' is available. We have leaflets describing both. Would you like copies?

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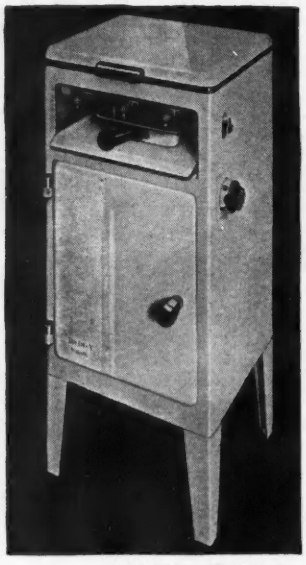
For small Kitchens and Flats...

The

Dainty

MINOR



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Its cast-iron construction ensures durability and low maintenance cost.

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Approved and adopted by leading gas boards.

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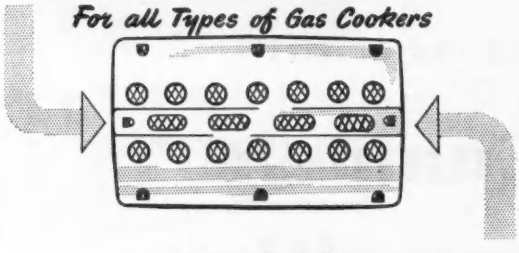

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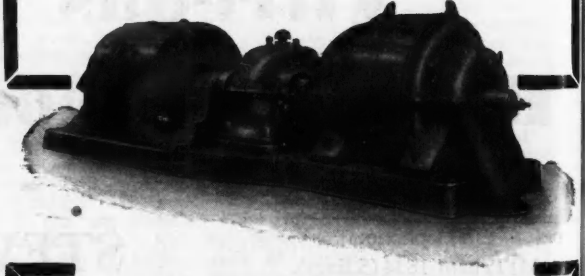

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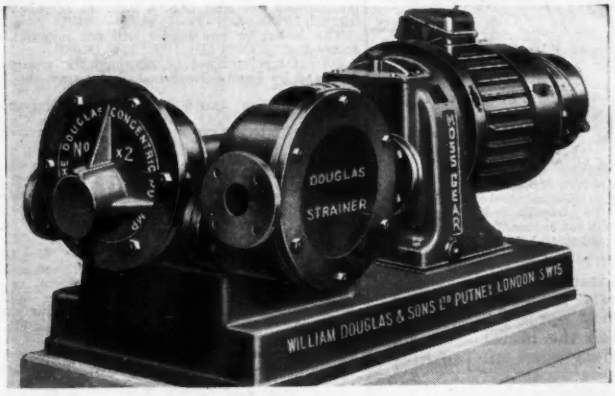

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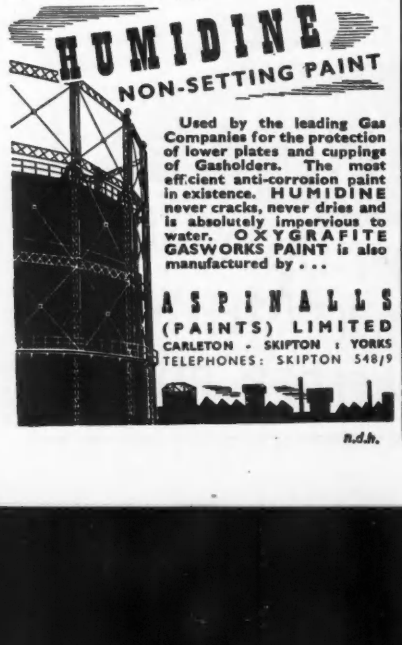

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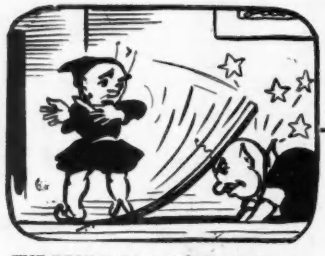

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APPLICATIONS are invited from suitably qualified persons holding Higher Grade Certificate in Gas Engineering (Supply) for the appointment of ASSISTANT DISTRIBUTION ENGINEER to the Darlington Unit.

The salary offered for the post is in accordance with A.P.T. Grade VII of the National Scales for Salaries, viz., £450-£530 per annum.

Candidates must have a thorough knowledge of modern methods of gas distribution, including high and low pressure systems.

The successful candidate will be required to pass a medical examination and to subscribe to such superannuation scheme as may be adopted by the Board.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to Charles Hindle, Esq., Engineer and Manager, Darlington Unit, Northern Gas Board, John Street, Darlington, not later than January 20, 1951.

F. WILSON,
Divisional General Manager.

December 20, 1950.

NORTHERN GAS BOARD

SUNDERLAND DIVISION.
CONSETT UNIT.
DISTRIBUTION SUPERINTENDENT.

APPLICATIONS are invited from suitably qualified persons for the appointment of DISTRIBUTION SUPERINTENDENT at the above Unit.

Applicants must be experienced in all branches of gas utilisation and distribution and have a sound knowledge of high and low pressure gas transmission, service work, and the fitting and maintenance of appliances.

Applicants must have definite distribution experience and possess recognised technical qualifications. Preference will be given to applicants holding the Institution of Gas Engineers Higher Grade Certificate (Gas Supply) or equivalent technical qualification.

Salary Grade A.P.T. VII, Provincial B, Scale £435-£515, and commencing at a figure commensurate with qualifications and experience.

The successful candidate will be required to pass a medical examination and the appointment will be subject to the provisions of such superannuation scheme as may be adopted by the Board.

Applications, stating age, experience and qualifications, giving names of two referees, should be addressed to Mr. J. R. Matthew, Unit Manager, Consett Unit, Thomas Street, Consett, Co. Durham, within 14 days of the issue of this advertisement.

W. O. KIRKWOOD,
Divisional General Manager.

Fawcett Street,
Sunderland.
December 21, 1950.

NORTHERN GAS BOARD

SUNDERLAND DIVISION.
CHEMIST.

APPLICATIONS are invited from suitably qualified persons for the above position, to take over the supervision of chemical testing throughout the Division. Practical experience of modern gasworks plant operation and routine testing is essential.

Salary Grade A.P.T. VIII Scale £490-£570, and commencing at a figure commensurate with qualifications and experience.

The successful candidate will be required to pass a medical examination and the appointment will be subject to the provisions of such superannuation scheme as may be adopted by the Board.

Applications, stating age, experience and qualifications, giving names of two referees, should be addressed to the undersigned within 14 days of the issue of this advertisement.

W. O. KIRKWOOD,
Divisional General Manager.

Fawcett Street,
Sunderland.
December 21, 1950.

SCOTTISH GAS BOARD

EDINBURGH GROUP.
CHIEF CONSTRUCTIONAL ASSISTANT.

APPLICATIONS are invited for the position of CHIEF CONSTRUCTIONAL ASSISTANT in the drawing office at the Granton Works of the Edinburgh Undertaking.

The successful candidate will be responsible for major construction and renewal of plant including substantial works extensions from planning stage to completion, and must be capable of preparing specifications and drawings for, and of directing construction and erection of all kinds of gasworks plant.

Candidates are required to possess the Higher Grade Certificate in Gas Engineering (Manufacture) or an equivalent qualification of the Institution of Mechanical, Civil or Structural Engineers.

The salary scale will be A.P.T. XII, £645 to £770 per annum, and placing on the scale will be in accordance with experience and qualifications.

The successful candidate will be required to pass a medical examination and will be subject to the provisions of any superannuation scheme which the Board may introduce.

Applications, stating age, training, qualifications, and experience, accompanied by *copies* of not more than three Testimonials, should be made to the undersigned not later than the first post on Monday January 15, 1951.

DAVID BEAVIS,
Group Manager.

15, Calton Hill,
Edinburgh, 1.

WALES GAS BOARD

PORT TALBOT UNDERTAKING.

APPLICATIONS are invited for the position of CLERK OF WORKS for the supervision of the erection of large scale extensions at the Aberavon Gasworks of the above undertaking. The position is a temporary one of approximately two years duration, but with satisfactory service it is possible that the position may become permanent within the area of the Board.

Applicants should, preferably, have had experience in the supervision of large scale engineering contracts in the gas industry.

Salary will be £500 per annum.

Applications, stating age, and giving full particulars of education, training, qualifications and experience, together with the names of two referees, should be received by the undersigned within 14 days of publication of this advertisement.

W. F. EDWARDS, F.C.I.S.,
General Manager and Secretary.

Port Talbot Gas Undertaking,
18, Station Road,
Port Talbot,
Glam.

WALES GAS BOARD

PORT TALBOT UNDERTAKING.

APPLICATIONS are invited from suitably qualified persons for the position of ENGINEERING ASSISTANT to the Port Talbot Undertaking, Wales Gas Board.

The present output of the undertaking is 5.5 mill. cu.ft. per day, and the works will be extended to an output of 14 mill. cu.ft. per day by 1953—the gas supplied being from coke oven and C.W.G. plants.

By 1953 new holder, C.W.G. plants, purifiers and compressors will be installed, and future extensions planned.

It is essential that the applicants be experienced in the preparation of specifications for, and in the design and supervision of large scale gasworks extensions.

Applicants should preferably have had experience in the operation of coal gas and C.W.G. plants.

The successful applicant will be required to pass a medical examination, and to subscribe to such scheme of superannuation as the Board may adopt in the future.

Salary will be within the range of £645-£770 and the commencing salary will depend upon the qualifications and experience of the successful applicant.

Applications, stating age and giving full particulars of education, training, qualifications and experience, together with the names of two referees, should be received by the undersigned within 14 days of publication of this advertisement.

W. F. EDWARDS, F.C.I.S.,
General Manager and Secretary.

Port Talbot Undertaking,
Wales Gas Board,
18 Station Road,
Port Talbot,
Glam.

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE CO., LTD.,

24, FENNEL STREET, MANCHESTER, 4.

GASHOLDER SURVEYORS.

THE Company has vacancies for SURVEYORS. Permanent position; progressive salary scale with non-contributory pension. Candidates, age 26 to 34 years, who have served an apprenticeship with a reputable firm of gasholder manufacturers are invited to apply stating age and qualifications. Experience on outside erection of gasholders essential. Knowledge of both rivetted and welded construction an advantage.

EAST MIDLANDS GAS BOARD

NOTTS. AND DERBY DIVISION.
ILKESTON UNDERTAKING.
TECHNICAL ASSISTANT.

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT in the above Undertaking

Applicants should hold the Higher Grade Certificate in Gas Engineering (Manufacture), should have a sound experience in works operation, the control of W.D. vertical retorts, laboratory tests, and be capable of making simple drawings.

The salary will be in accordance with A.P.T. Grade VI, £415 to £495 per annum, the commencing salary selected according to age and experience.

The successful applicant will be required to pass a medical examination and the appointment will be subject to such superannuation scheme as may be adopted by the Board.

Applications, stating age and experience and giving full particulars of training, qualifications, together with the names of two referees, should be addressed to the undersigned for receipt within 14 days of the appearance of this notice.

K. L. PEARCE,
Divisional General Manager.

East Midlands Gas Board,
Notts. and Derby Division,
Friar Gate,
Derby.
KLP/EMT/AMW.

(Classified advertisements continued on Supplement 6)

APPOINTMENTS VACANT (ctd.)

DRAUGHTSMEN

GAS PLANT.

IMPORTANT Midland Company require a number of first class DESIGN and/or DETAILING DRAUGHTSMEN for all classes of Gas Holders and Gas Plant, etc., positions offer exceptional experience.

Canteen and excellent working conditions available.

Particulars and salary required to Personnel Manager, Horseley Bridge and Thomas Piggott, Ltd., Tipton, Staffs.

WEST MIDLANDS GAS BOARD

KIDDERMINSTER DISTRICT.

WANTED. A competent MAIN AND SERVICE LAYER with sound practical experience, and a FIRST CLASS GAS FITTER, experienced in the fixing and maintenance of all types of modern gas appliances.

Wages according to the National Joint Industrial Council for the Gas Industry. Provincial 'B' Rates.

Applications, stating age, experience and *copies* of references, to the Manager, West Midlands Gas Board, Kidderminster District, Pitts Lane, Kidderminster.

WEST MIDLANDS GAS BOARD

BIRMINGHAM DISTRICT.

VACANCIES ON CHEMICAL STAFF.

CENTRAL LABORATORY, NECHELLS GAS-WORKS.

APPLICATIONS are invited for the following positions on the Chemical Staff of the Central Laboratory, Nechells Gasworks (Birmingham District):

(1) GRADUATE CHEMIST to assist Senior Works Chemist in gasworks routine chemical control, including gas calorimetry in the Area of the West Midlands Gas Board. Salary Grade XI, £595-£720.

(2) GRADUATE CHEMIST or METALLURGIST to assist Senior Refractories Metallurgist in the control by testing and analysis of refractories, and to assist in the investigation of refractories problems in the Area of the West Midlands Gas Board. Knowledge of X-ray crystallography work useful. Salary Grade XI, £595-£720.

(3) GRADUATE ANALYTICAL CHEMIST to assist Chemist in charge of Analytical Laboratories in analysis and development of analytical methods, &c. Salary Grade XII, £645-£770.

(4) GRADUATE CHEMICAL ENGINEER to assist in chemical work and supervision of plants such as benzole recovery, dephenolation, liquor concentration, water softening, &c., in the Area of the West Midlands Gas Board. Salary Grade XI, £595-£720.

(5) GRADUATE AND ANALYTICAL CHEMIST to assist in general analytical work, including work for assessing the effect of effluents on the filter beds of sewage works. Salary Grade VIII, male £490-£570, female £392-£456.

(6) GRADUATE AND ANALYTICAL CHEMIST to assist in general analytical work, including gas analysis. Salary Grade VIII, male £490-£570, female £392-£456.

It will be necessary for candidates to indicate for which position or positions they are applying.

Applicants for posts in Grade XI or over should have at least two or three years post-graduate experience.

The successful applicants may be required to pass a medical examination and will be subject to such superannuation regulations as the Board may, in due course, adopt.

Applications, stating nature of degree, age, experience, together with the names of two referees, should be addressed to Mr. J. E. Wakeford, Divisional Manager, West Midlands Gas Board, Birmingham District, Gas Offices, Edmund Street, Birmingham, 3, to reach him not later than January 20, 1951. Applicants are requested to quote reference T.P.3 when replying to this advertisement.

F. H. CURETON,
Secretary.

WEST MIDLANDS GAS BOARD

PLANNING AND CONSTRUCTIONAL ENGINEER.

APPLICATIONS are invited for the appointment of PLANNING AND CONSTRUCTIONAL ENGINEER at Headquarters of the West Midlands Gas Board.

Candidates must have had a wide experience in planning and constructional engineering as applied to the gas industry and will be required to give specialist advice to Divisional Engineers in addition to the collation and presentation of papers to the Board.

The salary offered will be commensurate with the experience of the successful applicant, but will not be less than £2,500 per annum.

The successful applicant may be required to pass a medical examination and the appointment will be subject to any superannuation scheme which the Board may introduce.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the Personnel and Establishment Officer, West Midlands Gas Board, Gas Offices, Edmund Street, Birmingham, 3, to reach him not later than January 20, 1951. Applicants are requested to quote reference T.P.3 when replying to this advertisement.

F. H. CURETON,
Secretary.

WEST MIDLANDS GAS BOARD

PRODUCTION ENGINEER.

APPLICATIONS are invited for the post of PRODUCTION ENGINEER at the Headquarters of the West Midlands Gas Board, Birmingham.

Applicants should be well qualified and have had considerable experience with all types of carbonising plant and the manufacture of carburetted water gas. The object of this appointment is to improve the efficiency of gas manufactured by every means possible. The successful candidate will be required to give specialist advice to Divisional and District Engineers and to maintain production records at Headquarters for presentation to the Board. It will be one of the duties of the office to keep resetting and maintenance records applicable to carbonising and C.W.G. plant.

The salary offered will be commensurate with the experience of the successful applicant, but will not be less than £2,000 per annum.

The successful applicant may be required to pass a medical examination and the appointment will be subject to any superannuation scheme which the Board may introduce.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the Personnel and Establishment Officer, West Midlands Gas Board, Gas Offices, Edmund Street, Birmingham, 3, to reach him not later than January 20, 1951. Applicants are requested to quote reference T.P.3 when replying to this advertisement.

F. H. CURETON,
Secretary.

GAS AND FUEL CORPORATION OF VICTORIA, AUSTRALIA

APPLICATIONS, returnable to the Secretary, Premier's Department, Melbourne, C.2, by March 31, 1951, are invited for appointment to the office of Chairman of Directors of the Gas and Fuel Corporation of Victoria, under the Gas and Fuel Corporation Act, 1950.

The Corporation is empowered to carry on the businesses of production, sale and supply of town gas, the gasification of brown coal by the Lurgi high pressure gasification process, the recovery, manufacture and sale of coke, tar, pitch, ammonia, dyes and other residual and synthetic products also by-products and residuals arising in the manufacture of town gas.

The salary is £5,000 per annum.

Full details of the functions and scope of the Corporation are contained in the Victorian Gas and Fuel Corporation Act, 1950.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON AND DISTRICT DIVISION.

TECHNICAL ASSISTANT—WOLVERHAMPTON DISTRICT.

APPLICATIONS are invited from suitably qualified persons for the above appointment.

Applicants should have theoretical and practical experience in the operation and control of Continuous Vertical Retorts, purification and by-product plant, and be willing to do shift work. A knowledge of Carburetted Water Gas Plants would be an advantage.

The appointment will be in Grade A.P.T. VI. of the Salary Scales of the National Joint Council for Gas Staffs and the commencing salary within the range of £415 to £495 per annum according to age, ability and experience.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of Superannuation as the Board may adopt in the future. Any existing superannuation rights in the Gas Industry would be maintained.

Applications, stating age, qualifications and experience, together with details of present and previous appointments, and the names of two referees, should be addressed to: Mr. F. C. BRIGGS, Divisional Manager, West Midlands Gas Board, Gas Offices, Kensington House, Bath Street, Dudley, Worcs., to reach him not later than fourteen days after the publication of this advertisement. Applicants are requested to quote ref. T.P.3, when replying to this advertisement.

F. H. CURETON,
Secretary.

WEST MIDLANDS GAS BOARD

WARWICKSHIRE DIVISION.

HINCKLEY DISTRICT.

PRODUCTION ENGINEER.

APPLICATIONS are invited from suitably qualified persons for the above position at Hinckley Gasworks.

Candidates should possess the Institution of Gas Engineers Higher Grade Certificate in Gas Engineering (Manufacture). They should have had considerable carbonising experience, preferably with Woodall-Duckham continuous plant, and be fully conversant with the normal production procedure, including all maintenance necessary for a 500 mill. works, and capable of controlling all labour. The person appointed will be directly responsible to the Deputy Engineer and Manager.

The commencing salary will be within the range of £520-£620 per annum in accordance with Grade IX of the Salary Scales of the National Joint Council for Gas Staffs.

The appointment will be subject to such superannuation regulations as the Board may, in due course, adopt, and the successful candidate may be required to pass a medical examination.

Applications, giving details of age, qualifications and experience, together with the names of two referees, should be addressed to Mr. A. Allen, Divisional Manager, West Midlands Gas Board, Warwickshire Division, Gas Street, Coventry, to reach him not later than 14 days after the appearance of this advertisement. Applicants are requested to quote reference T.P.3 when replying to this advertisement.

F. H. CURETON,
Secretary.

SOUTH WESTERN GAS BOARD

WESTON-SUPER-MARE SUB-DIVISION.

APPLICATIONS are invited for the post of JUNIOR CHEMIST at the Weston-super-Mare Unit.

Salary A.P.T., Grade III, commencing at £310 per annum.

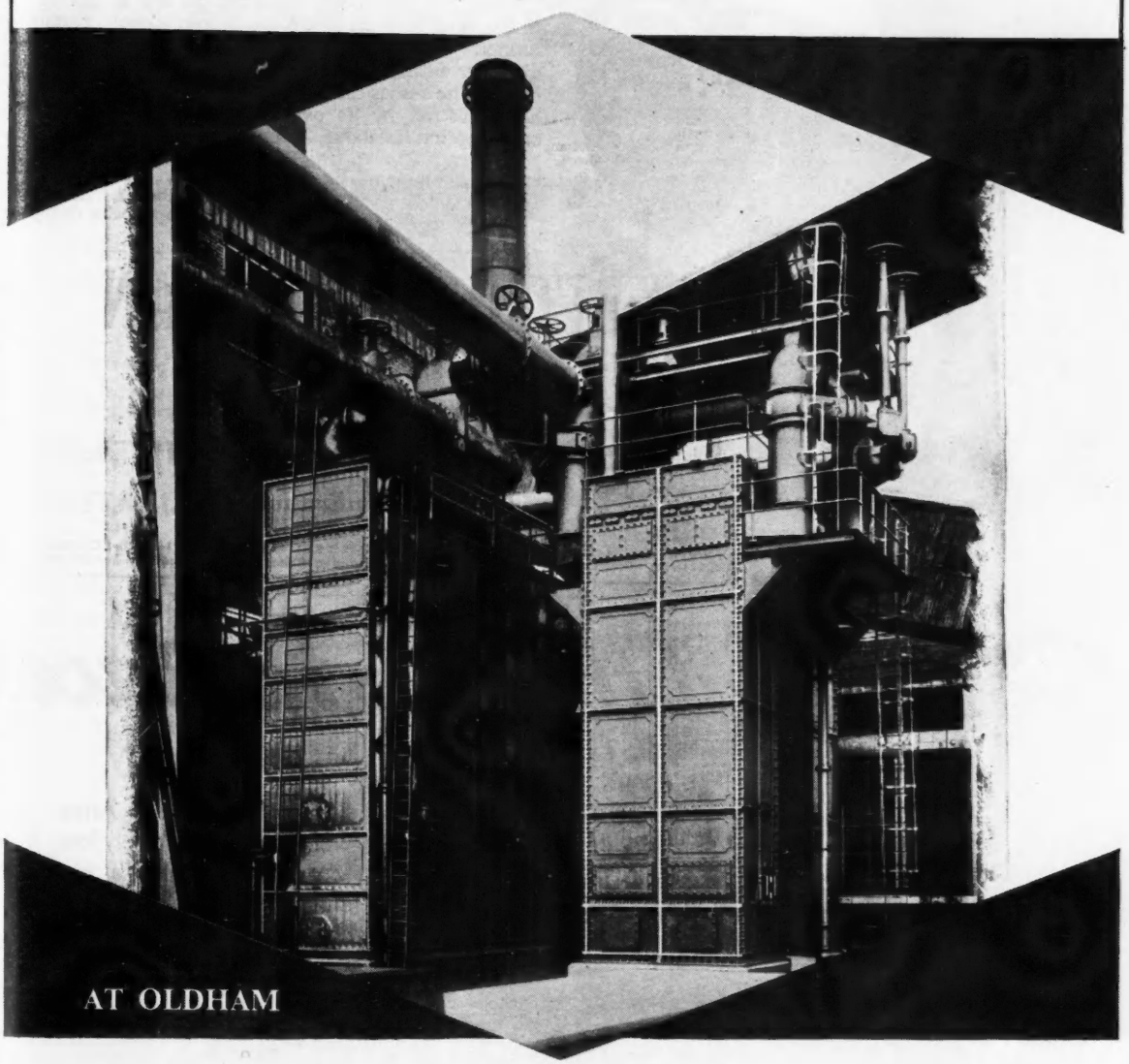
Candidates must have completed their military service, and be capable of carrying out works routine laboratory and plant chemical tests.

Applications should be addressed to the undersigned, and be delivered before January 13, 1951.

W. J. BAKER,
Sub-Divisional Manager.
'Kingsholme,'
Arundell Road,
Weston-super-Mare.

STRINGER BROTHERS
ALBION WEST BROMWICH
S.B
IRON & STEEL
PLATES & SHEETS
BARS & SECTIONS
Telephone:
WEST BROMWICH 0436-7

MODERN CONDENSING PRACTICE



AT OLDHAM

Two types of Holmes high efficiency Condensers installed at the Oldham Gasworks.

Left. Super Type Horizontal Tube Condensers mounted upon tar and liquor separators.

Right. Multipass Vertical Tube Condensers, incorporating Holmes patent sprays for maintaining clean internal conditions.

Reproduction by courtesy of the North Western Gas Board.

FOUNDED 1850
HOLMES
HUDDERSFIELD

W. C. HOLMES & CO. LTD · TURNBRIDGE · HUDDERSFIELD

Telephones: HUDDERSFIELD 5280 LONDON: Victoria 9971 BIRMINGHAM: Midland 6830

C364

THIS is a medium temperature infra-red radiant heat burner for use on high pressure gas supplies only, say 3 to 5 lbs. per square inch, and it can be fitted to any type of oven or any travelling tunnel or stationary tunnel. A heat-resisting metal disc of about 4 inches diameter forms the radiant and operates at a bright red heat. The disc is mounted in a cast iron holder, and each holder is fed by its own high pressure injector. Gas consumption is about 20 cubic feet per hour.

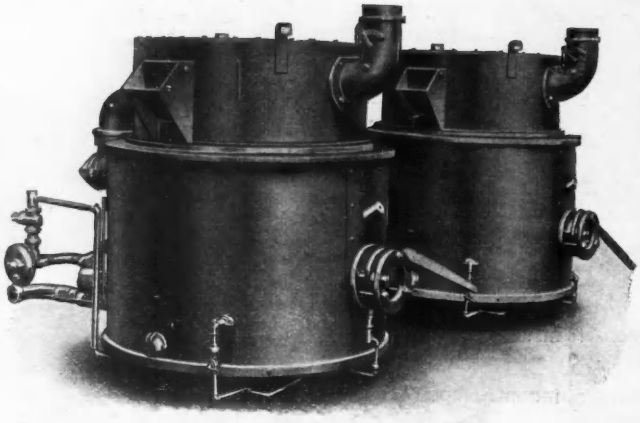
THE illustrations show, at the top, both sides of the KEITH BLACKMAN Infra-red Burner, and at the bottom six of twelve burners applied to a paint drying oven.

KEITH BLACKMAN
INFRA-RED
GAS BURNER

Price on application

KEITH BLACKMAN LTD., MILL MEAD ROAD, LONDON, N.17. TN: TOTTENHAM 4522. TA: "KEITHBLAC NORPHONE LONDON."
Branch Offices in Manchester, Birmingham, Leeds, Newcastle-on-Tyne, Glasgow, Penarth nr. Cardiff, and Belfast. Works: London and Arbroath.

Soft Metal Melting Furnaces



The melting of Soft Metal Alloy is essentially one of relatively low temperature but requires a fast heat input to obtain maximum production.

This heating must be well distributed to avoid hot spots which reduce pot life.

This problem of heat balance has been carefully worked out in our Soft Metal Melting Furnaces.

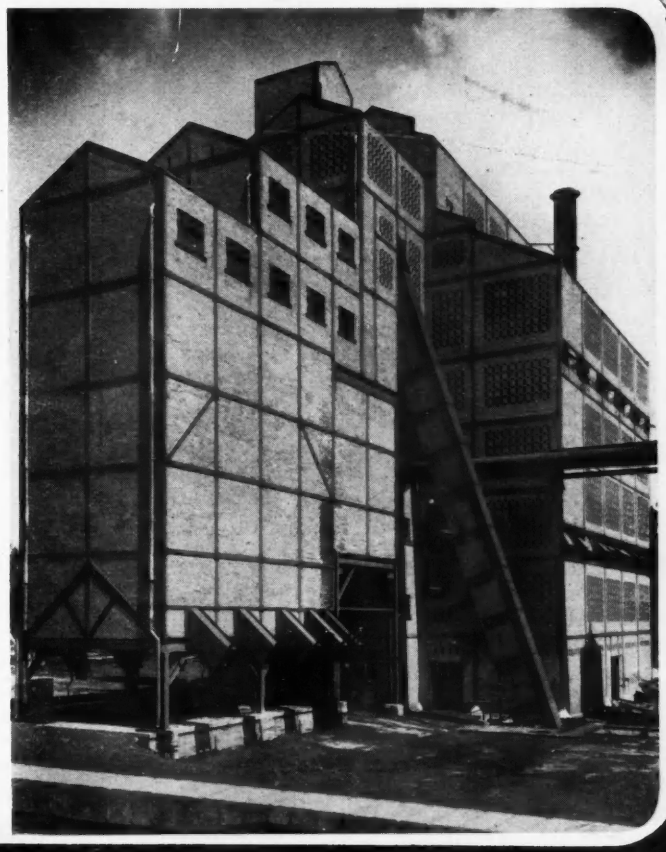
For fast and economical melting with low maintenance

Associated with SURFACE COMBUSTION CORPORATION, TOLEDO, U.S.A.

Consult BRITISH FURNACES LTD CHESTERFIELD

Printed by STRAKER BROTHERS LTD., E.C.2, for WALTER KING, LIMITED, 11, BOLT COURT, FLEET STREET, LONDON, E.C.4. Wednesday, January 3, 1951.

Work in progress



OX HILL, VICTORIA
AUSTRALIA

view of the Coke Plant end of
he new Glover-West Retort House.

West's Gas
IMPROVEMENT CO., LTD.
MILES PLATTING, MANCHESTER, 10
Telephone: COLlyhurst 2961-5. Telegrams: Stoker, Manchester.
COLUMBIA HOUSE, ALDWYCH, W.C.2. Telephone: HOLborn 4108-9. Telegrams: Wesgasco, Estrand.

The new Ascot 709 Multipoint

A TECHNICALLY IMPROVED SUCCESSOR TO THE FAMOUS NEA 32/6

★ Built-in gas governor

★ Fitted with a completely new thin-flame stainless steel burner

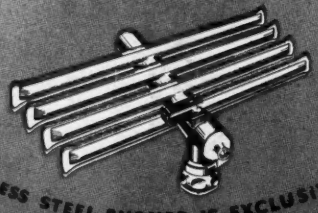
★ Wider fin spacing on the new heat exchanger gives more generous flue-ways to obviate choking by deposits

★ A redesigned gas section has a single rotary gas control for main and pilot cocks instead of the two horizontal handles

The new stainless steel burner has positive advantages. It is highly resistant to corrosion so that blockage due to this cause is practically eliminated. The period between essential servicing is thus greatly lengthened, and total expectation of life increased.

Stainless steel also gives greater rigidity and strength, which is enhanced in the thin-flame type of burner as there are fewer tubes of larger section.

LONGER SERVICE LIFE • LESS MAINTENANCE



THE STAINLESS STEEL BURNER IS EXCLUSIVE TO ASCOT

ASCOT GAS WATER HEATERS LTD. · 43 PARK ST. · LONDON, W.1 · GRO 4491

ASCOT

Ascot makes the most of gas